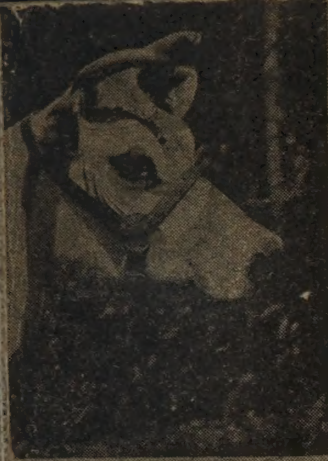




Minnesota Farmers' Institute Annual



No. 36

1923

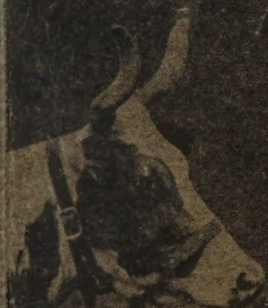


The Dairy Cow

Selection

Feeding

Management



AN ODE TO THE DAIRY COW

The hogs may lift the mortgage
The hens pay grocery bills
But that don't leave us much of worth
To mention in our wills.

From shingle nails to autos
Fencing to tractor plows
We pull most everything we need
From our old dairy cows.

It takes a lot of stripping
We handle tons of milk
We wear more overalls, it's true
Than fancy shirts of silk.

But we have health, and happiness
A steady job worth while
I wouldn't trade my good old cows
For Rockefeller's pile.

—Hodgson

Minnesota Farmers' Institute Annual

NUMBER 36, 1923

EDITED BY

F. W. PECK

Director of Minnesota Farmers' Institutes and Agricultural
Extension Division

University Farm, St. Paul, Minnesota

AND

J. M. DREW

Agricultural Extension Division University of Minnesota

University Farm, St. Paul, Minnesota

*"The Cow is a lady and a mother
and should be treated accordingly."*



(40,000 Copies Issued)

THE COLWELL PRESS

1923

MEMBERS OF THE BOARD OF ADMINISTRATION
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- Hon. A. D. WILSON.....Guthrie, Minn.
Regent of the University of Minnesota.

LETTER OF TRANSMITTAL

To the President of the Board of Administration of the
Farmers' Institute of Minnesota:

I transmit to you the following report of the work of the Farmers' Institutes for the year ending June 30th, 1923:

Farmers' Institutes were held as follows:

Place	Date	Ses- sions	At- tend- ance	Place	Date	Ses- sions	At- tend- ance
Ogema	Dec. 5	1	20	Birchdale	Jan. 31	1	65
Mahnomen	Dec. 6	2	50	Heron Lake	Jan. 31	2	600
Westbury	Dec. 7	1	20	Badger	Feb. 1	1	25
Waubun	Dec. 8	2	70	Courtland	Feb. 1	1	15
Bronson	Dec. 11	1	30	Strathcona	Feb. 2	1	10
Puposky	Dec. 15	1	40	St. George	Feb. 2	1	40
Sebeka	Dec. 16	2	100	Gonvick	Feb. 6	2	50
Aldrich	Dec. 18	2	125	Boyd	Feb. 6	1	25
Burtrum	Dec. 19	2	130	Clearbrook	Feb. 7	2	80
Long Prairie	Dec. 20	1	50	Louisburg	Feb. 7	1	35
Deer Creek	Dec. 22	2	80	Rosby	Feb. 8	2	55
Tracy	Dec. 27-28-29	3	600	Cottonwood	Feb. 8	1	75
Sedan	Jan. 9	2	70	Tenstrike	Feb. 9	2	50
LeSueur Center	Jan. 9	1	35	Minneota	Feb. 9	2	110
Glenwood	Jan. 10	2	70	Laporte	Feb. 10	2	75
New Prague	Jan. 10	2	70	Osage	Feb. 12	2	150
Pelican Rapids	Jan. 11	1	85	Tyler	Feb. 10	2	90
Waldorf	Jan. 11	1	60	Ivanhoe	Feb. 12	1	50
Battle Lake	Jan. 12	2	125	Crosby	Feb. 13	2	75
Elysian	Jan. 12	1	85	Holly	Feb. 15	1	55
Wolverton	Jan. 13	1	40	Onamia	Feb. 16	2	75
Carver	Jan. 13	1	60	Dundee	Feb. 16	1	70
Rothsay	Jan. 15	2	120	Duluth	Feb. 17	2	120
New Germany	Jan. 15	1	70	Kimball	Feb. 20	2	130
Brooks	Jan. 16	1	30	Wanamingo	Feb. 20	2	150
Raymond	Jan. 16	1	100	Paynesville	Feb. 21	2	125
Oklee	Jan. 17	2	50	Kenyon	Feb. 21	1	100
Willmar	Jan. 17	2	160	Richmond	Feb. 22	2	240
Thief River Falls	Jan. 18	2	50	Elgin	Feb. 22	1	40
Litchfield	Jan. 18	2	90	St. Cloud	Feb. 23-24	3	275
Goodridge	Jan. 19	2	170	Byron	Feb. 23	1	55
Grove City	Jan. 19	1	45	St. Francis	Feb. 24	2	200
Meadowlands	Jan. 24	2	120	Centerville	Feb. 26	2	110
Springfield	Jan. 23	1	150	Elk River	Feb. 27	2	50
Evan	Jan. 24	1	130	Witoka	Feb. 27	1	125
Windigo	Jan. 25	2	90	Becker	Feb. 28	2	135
Monterey	Jan. 25	2	425	Dakota	Feb. 28	1	75
Goodland	Jan. 26	2	80				
Nashville	Jan. 26	1	50	Number of Institutes held.....			82
Jessie Lake	Jan. 27	2	80	Number of Sessions.....			129
Bricelyn	Jan. 27	1	50	Total Attendance			8255
Mizpah	Jan. 29	2	100	Average per Institute.....			100
Frost	Jan. 29	1	65	Average per Session.....			64
Littlefork	Jan. 30	2	100				
Sioux Valley	Jan. 30	1	110				

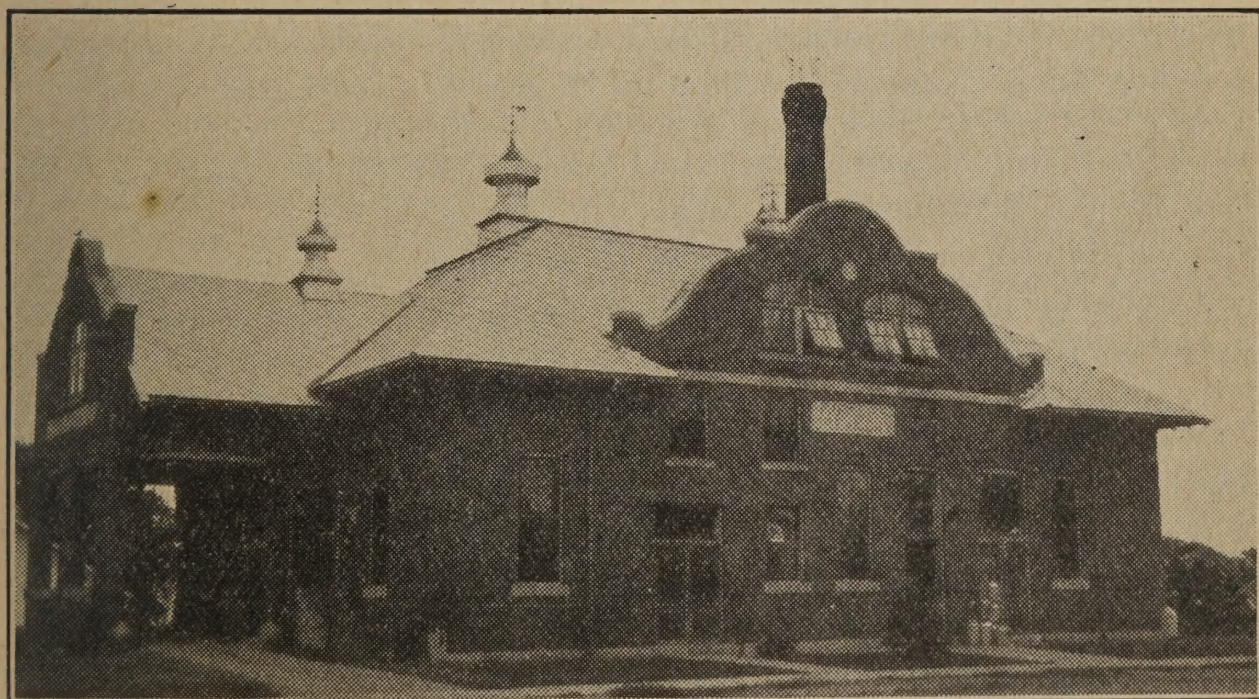
FINANCIAL STATEMENT

For the year ending June 30th, 1923

EXPENDITURES

1922:		1923:	
July 15	C. H. Welch, salary..\$ 37.50	Jan. 15	C. H. Welch, salary.. 37.50
	O. C. Gregg, salary... 50.00		Leona Palmer, salary.. 50.00
	Leona Palmer, salary.. 50.00		O. C. Gregg, salary... 50.00
July 31	C. H. Welch, salary.. 37.50		J. E. Eastgate, expense 88.39
	O. C. Gregg, salary... 50.00		Minn. Engr. & Color-
	Leona Palmer, salary.. 50.00		plate Co., engrav-
	E. A. Stewart (photos		ings for Annual.... 149.49
	for Annual) 20.87	Jan. 31	C. H. Welch, salary.. 37.50
Aug. 15	C. H. Welch, salary.. 37.50		Leona Palmer, salary.. 50.00
	O. C. Gregg, salary... 50.00		O. C. Gregg, salary... 50.00
	Leona Palmer, salary.. 50.00		O. M. Olson, services 175.00
Aug. 31	C. H. Welch, salary.. 37.50		E. W. Smith, services 200.00
	Leona Palmer, salary.. 50.00		C. E. Brown, services 40.00
	O. C. Gregg, salary... 50.00		A. J. Olson, services.. 125.00
Sept. 15	C. H. Welch, salary.. 37.50		Nels Moberg, services 175.00
	Leona Palmer, salary.. 50.00		A. J. Olson, expense.. 27.49
	O. C. Gregg, salary... 50.00		E. W. Smith, expense 64.62
Sept. 30	C. H. Welch, salary.. 37.50	Feb. 15	C. H. Welch, salary.. 37.50
	O. C. Gregg, salary... 50.00		O. C. Gregg, salary... 50.00
	Leona Palmer, salary.. 50.00		Leona Palmer, salary.. 50.00
	Elda Anderson,		Charles Mathews,
	services 86.66		services 100.00
Oct. 15	C. H. Welch, salary.. 37.50		Charles Matthews,
	Leona Palmer, salary.. 50.00		expense 32.31
	O. C. Gregg, salary... 50.00		A. J. Olson, expense.. 55.69
Oct. 31	Leona Palmer, salary.. 50.00		O. M. Olson, expense. 109.14
	C. H. Welch, salary.. 37.50		E. W. Smith, expense 58.80
	O. C. Gregg, salary... 50.00		Nels Moberg, expense 93.06
Nov. 15	C. H. Welch, salary.. 37.50		Tribune Job Ptg. Co.,
	O. C. Gregg, salary... 50.00		Annual 35.....2,352.92
	Leona Palmer, salary.. 50.00		Tribune Job. Ptg. Co.
Nov. 30	C. H. Welch, salary.. 37.50		prepaid shipments . 21.67
	O. C. Gregg, salary... 50.00	Feb. 28	C. H. Welch salary.. 37.50
	Leona Palmer, salary.. 50.00		Leona Palmer, salary.. 50.00
Dec. 15	C. H. Welch, salary.. 37.50		O. C. Gregg, salary... 50.00
	O. C. Gregg, salary... 50.00		O. M. Olson, services 200.00
	Leona Palmer, salary.. 50.00		E. W. Smith, services 200.00
	Remington Typewrit-		Charles Matthews,
	er Co. (paper).... 1.90		services 100.00
Dec. 31	C. H. Welch, salary.. 37.50		A. J. Olson, services.. 200.00
	Leona Palmer, salary.. 50.00		Remington Typewrit-
	O. C. Gregg, salary... 50.00		er Co., paper 1.90
	O. M. Olson, services 200.00		E. W. Smith, expense 66.07
	E. W. Smith, services 200.00		A. J. Olson, expense.. 57.09
	John Christgau, serv-	Mar. 15	C. H. Welch, salary.. 37.50
	ices 110.00		Leona Palmer, salary.. 50.00
	J. E. Eastgate, services 150.00		O. C. Gregg, salary... 50.00
	O. M. Olson, expense 117.26		

	C. E. Brown, services	90.00			Remington Typewrit- er Co., repairs.....	19.00
	W. A. Dickinson, services	200.00	May 15		C. H. Welch, salary..	37.50
	Charles Matthews, services	50.00			O. C. Gregg, salary...	50.00
	O. M. Olson, services	25.00	May 31		Leona Palmer, salary.	50.00
	E. W. Smith, services	50.00			C. H. Welch, salary..	37.50
	C. E. Brown, expense	56.14			Leona Palmer, salary.	50.00
	W. A. Dickinson, expense	67.12	June 15		O. C. Gregg, salary...	50.00
	Charles Matthews, expense	111.52			C. J. Moos, postage..	100.00
	A. J. Olson, expense..	39.71	June 30		C. H. Welch, salary..	37.50
	O. M. Olson, expense	157.77			Leona Palmer, salary.	50.00
	E. W. Smith, expense	48.79			O. C. Gregg, salary...	50.00
	Midland Printery. posters	26.80			Leona Palmer, salary.	50.00
	Redwood Gazette, posters	4.50			Am. Type Foundry Co., repairs	2.48
Mar. 31	O. C. Gregg, salary...	50.00			Total expenditures..	\$9,992.58
	C. H. Welch, salary..	37.50		Resources:		
	Leona Palmer, salary.	50.00		Appropriation ..	\$10,000.00	\$10,000.00
	Charles Matthews, expense	30.67				
Apr. 15	C. H. Welch, salary..	37.50		Balance June 30, 1923.....		\$7.42
	O. C. Gregg, salary...	50.00			Respectfully submitted,	
	Leona Palmer, salary.	50.00			F. W. PECK,	
Apr. 30	C. H. Welch, salary..	37.50			Superintendent.	
	O. C. Gregg, salary...	50.00				
	Leona Palmer, salary.	50.00				



A Typical Minnesota Cooperative Creamery

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Minnesota Farmers' Institute Annual

VOL.

NOVEMBER, 1923

XXXVI

Introduction

F. W. PECK, UNIVERSITY FARM

This Institute Annual is intended to present facts and practices of producing and marketing dairy products from actual experiences of those engaged in the dairy business. In so far as it presents ideas capable of being translated into **better** dairying by the individual it will be worth while as a publication. Those principles of better feeding, better care and better breeding that will result in a high quality product produced at a reasonably low cost per unit, need to be studied by every producer from the standpoint of his own individual problem.

These principles and practices will go back to the handling of the soil and the problem of its fertility; to the choice of crops and the value of more legume roughages; to the study of profitable breeding practices; to the efficient type of dairy barn and equipment; to the study of rations and various combinations of feed that will tend to produce the product at such a cost as to leave a profit to the consumer.

The slogan of "better dairying" as it is being adopted in various sections of the State of Minnesota indicates the trend of thought of dairymen and those interested in the industry; but the still more significant indication is that the future development will tend more and more toward quality and efficiency rather than haphazard expansion and quantity production. Minnesota's volume of dairy business has reached such a commanding total that the logical direction of thought and purpose is now towards quality,

standardization, efficiency of production and marketing, and normal growth in volume of business.

Marked progress has been made in the development of quality and standards of dairy products in the past two years. This has been largely due to the educational program that all agencies have united in promoting and to the efforts of the cooperative marketing enterprises illustrated by the Cooperative Creameries' Association, and the Twin City Milk Producers' Association. This progress indicates the influence and power of organized and centralized effort in the process of distributing a large volume of product at a minimum cost.

It is logical to assume that the future development along the line of manufacturing and distribution of dairy products will be collective and cooperative in the true sense of these terms rather than individual or competitive in an unorganized way. Just as necessary should be the progress made in individual production, for the basis of successful cooperative distribution is economic production of a high quality product on the individual farm.

Efficient production does not mean a greater volume in product in the aggregate, nor does it include a campaign to get many individuals into the business who have not heretofore been producers; nor does it necessarily mean attempting to bring every cow for example, to the show type and to an abnormally large production. It rather means raising the average production per cow by elimina-

tion of the poor producers by more careful scientific feeding and a generally lower cost per unit of product. This may mean putting more cows on some farms, but it also means reducing the number of cows on some farms. It means changing the cropping systems and installing different equipment and changing marketing practices. Is the large number of cream stations, and the establishment of centralizers, a mark of dairy efficiency in the state, or is there apt to be finally a greater industry with great-

er profits if there is a wider cooperative movement with farmers more nearly controlling the distribution of their own product?

Surely there is need for consideration of these many angles to the dairy business for Minnesota has a wonderful opportunity to become the recognized leader in efficient dairy production and in the marketing of her dairy products if there is a common mind and a wider application of successful dairy practices in the state.

THE COW, THE FOSTER MOTHER OF MANKIND

W. C. COFFEY, UNIVERSITY FARM

As agriculture develops and expands and as it adds to the wealth of Minnesota, the dairy cow will be more and more important. This will be true because animals will likely always be very large factors in our agriculture. Corn, which has now become Minnesota's largest field crop, is still far below its maximum development. Animals, as now, will continue to be the chief outlet for the corn crop of America.

Why will the dairy cow be so important? Because she is so efficient in converting grain, grasses, silage and hay into valuable products. Her superiority over other food producing animals in her power to utilize feed indicates that her products will be more nearly used to the capacity of the people to consume them than will the products of other animals. According to Henry and Morrison she returns about six times as much edible product in her milk for each 100 pounds digestible nutrient in the food consumed as does the steer or sheep in the edible products they yield. A cow yielding only 8,000 pounds of milk of average composition produces annually in her milk 50 per cent more protein, 30 per cent more carbohydrates, (fat and sugar) and 19 per cent more mineral matter than there

is in the entire body of the fat steer weighing 1200 pounds.

Not only does the dairy cow have advantage in economy of production but also in the nature of the product she yields. The fat, the protein, the vitamins of milk and its derivatives are all essential to the growth and maintenance of the human body. A statement which will last in history because it is so true as well as so striking was made by the late W. D. Hoard of Wisconsin, when he called the dairy cow, "The foster mother of the human race."

All the evidence showing the superiority of the dairy cow in the production of human food does not warrant the assumption that she will completely replace other classes of animals; she will not, but there is no question as to her hold upon a very high position in the animal world.

Altho the dairy cow is destined to hold a unique position in our agriculture those interested in dairying should remember that the problems surrounding her selection, care and management are in no wise decreased by this fact. The greater the extent to which people use dairy products the more discriminating they will become with respect to their

Cow Surpasses Other Food-Producing Animals

HER superiority lies in her ability to convert grain, grasses, silage, and hay into valuable products, and this power indicates that her products will be more nearly used to the capacity of the people to consume them than will the products of other animals.

SHE will not replace completely other classes of animals, but there is no question as to her hold upon a very high place in the animal world.

W. C. Coffey, Dean and Director,
Department of Agriculture,
University of Minnesota.

quality, and agricultural economy will demand that the dairy cow be increasingly efficient in her production. A survey of conditions in Minnesota will show that many cows receive more feed and care than their production warrants. They should be replaced by better animals. Some cows fail to exhibit their innate possibilities because the feed and care given them is inadequate to their needs. They deserve either better owners, or more enterprising owners.

Importance of Care

Dairying will not fully come into its own until all of those who would own cows are prepared and disposed to give the animals under their management the kind of care that will permit cows of fairly high efficiency to exhibit their innate possibilities. Nor will dairying come into its own until these owners are determined to have none other than efficient cows. In other words, it will be a matter of getting the right cow into the right hands. Bringing all of this about involves many problems such as care, feeding, testing for milk and butterfat, and the control of disease. All of these subjects will be treated at some length in this report.

It is inconceivable that anyone who would be capable in his selection, care and management of the dairy herd would be unmindful of his duty toward the soil from which he secures the feed for his herd. It is here that the dairy cow once more exhibits her efficiency but perhaps to no greater extent than do some other classes of livestock. I have reference to her manure for maintaining and building up the fertility of the soil.

For growing animals and for maintaining cows in milk we have found that leguminous crops such as clover, alfalfa, and soy beans are very valuable. And since milk is the chief product of the dairy cow there can be no question but that there is a large place for these leguminous crops on dairy farms. Since these leguminous crops, when properly inoculated with the bacteria that live on their roots, gather nitrogen from the air and thereby add to the fertility of the soil, so far as nitrogen content is concerned, the cow in milk becomes a very important feature in a type of farming which more nearly insures the maintenance of the fertility of the soil than any other type we can adopt.

Because the usefulness of the dairy cow extends in such important directions, consideration of her forms a large part of the program of the college, the schools, the experiment station and the extension service of the Department of Agriculture. Dairy herds are maintained for instruction and experimental purposes at University Farm, Morris, Crookston, Grand Rapids, and Duluth; and a milking Shorthorn herd is maintained at Waseca. It should be remembered, however, that class room instruction, dairy research and the maintenance of our dairy herds at the various centers under our control do not represent all of what we are attempting to do for dairy farming. Studies in soil fertility, drainage, field crops, animal nutrition, animal diseases, farm management, marketing, farm buildings, entomology, yes even plant diseases all tend in the direction of improving conditions in agriculture so that still further improvement in dairy husbandry may be made.

RIGHT FEEDING NEEDED FOR HIGH PRODUCTION

C. H. ECKLES, University Farm

The objective of the dairy farmer is to produce the largest quantity of marketable product with the least expense. In this respect his purpose is not much unlike that of any other manufacturer, be the product shoes, plows, or dress goods.

The extent to which the dairy farmer is successful in attaining this end will depend first upon how efficient a set of machines he has, and second, how efficiently he uses them. To be more specific the amount of product obtained from a dairy cow depends upon, first, how good a dairy cow she is, and second, how skillfully she is fed and managed. Neither can take the place of the other. The best feeder in the world, with all the feeds ever used at hand, cannot induce a large milk production for a cow that was not born with the ability or temperament, or whatever you may call it, to use a large amount of food for this purpose. On the other hand, the most highly developed dairy cow ever born cannot go far in production without the proper feed and management. All that good breeding and careful selection of the individual animal can do is to give an efficient machine to work with. Having a good cow does not insure a large production, it merely makes it possible to secure such a production if the machine is properly handled.

If every farmer in Minnesota was provided right now with a herd of cows with the producing ability of Duchess Skylark Ormsby, or Countess Prue, the average results would be somewhat better than they are at present, to be sure, but still disappointing. Why? Because the limiting factor in the milk production of dairy herds is just as often a lack of proper feed as it is a lack of milking qualities. The tendency undoubtedly in

many cases is to attach too much importance to breeding. Without in the least detracting from the value of the "Better Sires" campaign, or the importance of improved blood, I will say that purebred bulls, and cows of better breeding do not help much unless accompanied by proper feeding.

In laying down a program for lowering the cost of production and improving a herd I would place feeding first. Before condemning any cow I would ask myself, "Has she had a chance to make good?" By giving a cow a chance I would mean having her dry for six weeks and in good flesh at calving time, then feeding her sufficient feed both in amount and kind so she could have no excuse for not "delivering the goods." If she does not when given a fair chance, look up the butcher's telephone number. The mistake is sometimes made of expecting a cow that has been poorly fed for several weeks or months to come back when the conditions of feed are corrected. Experienced dairy cattle men know that it is easy to let cows in milk slip down but hard to get them back. The point is a cow that has been trying to produce milk for weeks or months on a poor ration cannot be said to have had a fair chance to show what she can do even if her ration is then made above criticism. Testers for Cow Test Associations should understand this and not condemn cows until they have had a chance, that is, until they have had proper feeding from the time of calving.

A Good Ration Based Upon Good Roughage

The dairy ration should be based largely upon roughage. Wherever dairy cattle are kept successfully, in Minnesota, in Iowa, in any state in the Union,

Three Mistakes in Feeding Dairy Cows

NOT feeding liberally enough.

NOT giving enough protein.

LACK of individual feeding.

Individual feeding means feeding according to production of milk—according to her capacity to make milk.

or in Europe, it will be found that the most successful feeders base their ration upon a succulent feed and a legume hay. In the corn belt the succulent feed is corn silage. North of the limit of practical corn growing the succulent feed will probably be roots, or may be silage from sunflowers or peas and oats. The legume hay will probably be alfalfa, clover, or soy beans. With a succulent feed and a legume hay, concentrates are given in proportion to the production of the animal.

The most common mistakes made in feeding are, (1) not feeding liberally enough (2) not giving enough protein (3) lack of individual feeding.

The most successful dairy cow man, like the most successful beef cattle man, is a liberal feeder. A cow cannot produce milk without raw material in the form of feed any more than a shoe manufacturer can make shoes without leather. Furthermore, a surprisingly large proportion of the feed given the cow is required to maintain her body before anything is available to use for making milk. An average cow producing, say 275 pounds of butterfat in a year, uses just about half her total feed to maintain herself and the other half for milk production. She has to have this half of a full ration merely to keep up the machinery. The only part she can use for milk is what she gets above the maintenance requirement. After giving her half of a ration to keep her alive, doing chores for her all year, running the risk of her dying, giving her barn room, and paying taxes and interest on her value, I ask, is it good judgment to fail to give her all the feed she can use for milk production? In other words, economical milk production requires that we make use of all the capacity the cow has to make milk by giving her feed just as long as she uses it for milk production. I claim no man can afford to keep a lot of half fed

cows. Either feed them well or sell them.

The second common mistake in feeding cows is failure to give sufficient protein. This is especially true in the corn belt where corn and corn silage form a large part of the ration. The ideal way would be to produce a home grown ration supplying everything needed. This is possible under some conditions where the owner is satisfied with medium production. It is exceedingly difficult, if not impossible, however, to provide a home grown ration supplying ample protein for a high producing herd. The feeder of a well developed herd must expect to depend to some extent upon high protein concentrates to supplement his home grown feeds.

Individual Feeding

The third common mistake I mentioned is failure to feed the cows as individuals. How often we see the feeder go down the line giving each cow the same amount of grain. In many herds the production could be materially increased without the use of additional feed, merely by distributing it according to the production of the cow. One of the difficult questions to answer is how much grain can be fed with economy. The rule now so widely followed, of giving one pound to each three pounds of Guernsey or Jersey and one pound to four of Holstein or Ayrshire milk seems to meet conditions in the corn belt in general. Conditions arise at times, however, where a less liberal use of grain is more economical.

In adjusting the grain ration to the individual cow fewer mistakes will be made if the feeder follows the cow rather than expects the cow to follow him. The cow gives milk as the result of a stimulation of some kind applied to the udder from the inside. Physiologists tell us the stimulating substance is the product of a gland, somewhere in the body and acting through

the blood, which causes to the udder to secrete milk. The secretion of milk takes large quantities of nutrients from the body, and the cow is very hungry just as is the man who has worked hard all day. A high producing cow is a heavy eater because she requires the nutrients to replace those taken from her body to produce milk. However, she is not a heavy producer of milk as the result of being a heavy eater.

If the cow is in good condition when she freshens and is fed somewhere near correctly she will show what her capacity of milk production is soon after calving. If a cow produces 40 pounds of milk daily soon after being fresh be sure and feed her enough to supply what is needed to produce 40 pounds of milk. If she receives only enough for 30 pounds she will draw on the nutrients stored in her body for a while, then gradually come down to 30 pounds. The thing to do is to be sure and give her enough for 40 pounds while she is producing that much. Many cows that are given a reputation for lacking in persistency of milking really did not hold up as they were capable of doing on account of lacking the proper ration. If a cow that is already receiving a ration ample to supply everything needed for the milk she is producing goes down in milk she cannot be brought back by increasing the feed. The thing to do is to reduce the grain in proportion to her drop in milk. Remember giving the cow the proper ration to produce milk does not result in milk unless the stimulation to give milk is present in the cow. In other words, follow the milk production with the feeding, and do not assume that the milk flow can be pushed up and down at will with the feed. A common error resulting from a failure to properly understand these facts is to attempt to judge of the value of a certain feed by putting it in the ration of cows already several months in milk. When a cow has largely

lost the stimulation to give milk, which she receives at the time of freshening, the effect of a change of feed is slight.

Turning on Pasture in the Spring

Every owner of a cow welcomes the time when the animal can be turned out to pasture. Not only is the labor and expense connected with winter feeding done away with, but each cow is expected to give the best results of the year on grass. In changing from dry feed to grass, it is best to go somewhat slowly, especially with heavy milking cows. The young, immature grass, such as we have in early spring, contains a large amount of water and a small amount of dry matter, and it is almost impossible for a heavy milking cow to eat enough of such feed to supply the necessary amount of nutrients. Another reason for putting cattle on pasture gradually rather than suddenly, is the effect on the taste of milk. When a cow is changed at once from a grain ration to grass a very marked taste is developed in the milk, while if this change in feed is made gradually and not suddenly the change in the taste of the milk is scarcely noticed.

Summer Conditions to Be Maintained as Near as Possible Throughout the Year

Soon after the cows are on pasture, usually the latter part of May or the first part of June, they reach the maximum production of milk for the year. This suggests that what the dairyman must do, in order that the production of milk may be the largest, is to imitate these summer conditions as far as possible throughout the remainder of the year. This is what the careful dairyman and skilled feeder does, and the results correspond closely to the success with which these summer conditions are maintained. The summer conditions which bring about the maximum production and which should be maintained as

*Grain with Pasture
for High Producers*

COWS which give largely of milk need grain while on pasture—They do not get enough nutriment from grass alone.

SILAGE can be used economically to help out when pastures are short in midsummer.

far as possible through the year, are described in the following statement:

1. An abundance of palatable food.
2. A sufficient amount of protein.
3. A succulent feed.
4. Moderate temperature and comfortable surroundings.

Feeding Grain While on Pasture

There is some difference of opinion on this question from the standpoint of economy. There is no question but that a cow will produce more milk if fed grain while on pasture, and if a large yield is of more importance than economy of production, grain should certainly be fed. The cow that gives a small average quantity of milk will produce but little more, if fed grain while on pasture. However, with the heavy producing cow the case is quite different and it is necessary that she be fed grain or she will not continue on the high level of production long. The necessity of feeding grain to the high producing cow arises from the fact that she cannot secure a sufficient amount of nutrients from the grass alone, and must have some concentrated feed in the form of grain in order to produce large quantities of milk.

Experiments made by the Cornell Experiment Station, covering four years, showed that while an increase of milk yield was secured from grain feeding, it was not economical to produce it in this way. They secured only about an additional pound of milk for each pound of grain fed. In these experiments the pastures produced an abundance of nutritious grasses. They observed, however, that the cows fed grain during the summer gave better results after the grazing period was over, than those not having received grain. This is also a matter of common observation, and should be taken into account in considering the advisability of feeding grain. The point is that the cows fed grain stored a considerable quantity of surplus nutrients in their bodies which were afterwards

available for the production of milk. A Guernsey or Jersey cow that is giving as much as 20 pounds or 10 quarts per day, or a Holstein or Shorthorn giving 25 pounds or more daily should be given some grain. Our practice in regard to feeding on pasture is about as follows:

Guernsey or Jersey cow producing—

- 20 lbs. milk daily— 3 lbs. grain.
- 25 lbs. milk daily— 4 lbs. grain.
- 30 lbs. milk daily— 6 lbs. grain.
- 35 lbs. milk daily— 8 lbs. grain.
- 40 lbs. milk daily—10 lbs. grain.

Holstein, Shorthorn or Ayrshire producing—

- 25 lbs. milk daily— 3 lbs. grain.
- 30 lbs. milk daily— 5 lbs. grain.
- 35 lbs. milk daily— 7 lbs. grain.
- 40 lbs. milk daily— 9 lbs. grain.
- 50 lbs. milk daily—10 lbs. grain.

It must be kept in mind that this applies only when pastures are abundant. Where a small amount of grain is fed to a cow on pasture corn is as well adapted as anything else where it is cheaper than other feeds, since on account of the comparative narrow nutritive value of the grass the corn does not unbalance the ration. However, in case of feeding large quantities of grain, for example, 5 pounds per day or above, other feeds containing more protein should be used in part, such as bran, linseed meal, or oats.

Providing for Periods of Short Pasture

As long as fresh pasture grasses are abundant, the ordinary cow is about as well provided for as she can be to produce milk economically. Unfortunately the season of abundant pasture is often short. In many localities, a dry period, often of several weeks, occurs during the middle or latter part of the summer and the pastures become short and insufficient to maintain a full flow of milk. This season is often the critical time of the year for the dairy cow. It is prob-

Simple Rules for Feeding Dairy Cows

FEED all the silage and legume hay the animals will eat up clean.

FEED a grain mixture at the rate of one pound to each three pounds of Guernsey or Jersey milk, and one pound to each four pounds of Holstein milk.

C. H. Eckles, Chief Dairy Division,
Department of Agriculture,
University of Minnesota.

able that as much loss occurs one year with another by lack of feed at this time as occurs from improper feeding during the winter season. When the season of dry feeding arrives, the farmer expects to feed his stock and is prepared for it. On the other hand, as long as the cattle are on pasture and the field work is pressing, the tendency is to let the cows get along the best way they can.

Under average conditions in this state cows give a good flow of milk while the pastures are good, but when hot weather and short pastures come, the flow drops one half or two thirds. It is almost impossible to restore the flow of milk to the original amount after it is once allowed to run down from lack of feed. To make large returns from the cow a large yearly production must be had, and to do this, the flow of milk must be kept up ten or eleven months in the year.

It is possible to hold up the milk flow by heavy grain feeding, but this is unnecessarily expensive. Provision should always be made to have green crops on hand that may be cut and fed when needed or to have silage available. It is the nature of blue grass to grow freely in the spring, then to rest until fall. This leaves a period in the summer from about the middle of July to the middle of September when the pasture is apt to be short.

Green crops fed as a supplement to pasture may be fed in the pasture or in the barn lot, but as a rule are fed most economically in the barn. The cows remain inside long enough at milking time to eat their portions.

As a rule the most economical method of supplying feed to help out the short pastures of midsummer and fall is to feed corn silage. Silage will keep in good condition for summer feeding with no loss except on the surface. If it is not needed during the summer, it may

be covered with new silage and kept until wanted. Corn furnishes a larger yield of dry matter per acre than any crop than can be ordinarily grown for summer feeding, and has the further advantage of being on hand as early as wanted.

It is handled more economically also than soiling crops, since it is all cut at once and not every day, as is necessary with soiling crops.

RULES FOR FEEDING

1. Feed all the silage and legume hay the animals will eat up clean.

2. Feed a grain mixture at the rate of one pound to each three pounds of Guernsey or Jersey milk and one to each four pounds of Holstein milk.

Some Dairy Rations

Ration 1

Roughage:

Silage

Clover hay.

Grain Mixture:

Corn 100 lbs.

Oats 100 lbs.

Bran 100 lbs.

Add 2 pounds oilmeal to ration for cow producing above 1½ pounds fat daily.

Ration 2

Roughage:

Silage.

Alfalfa hay.

Grain Mixture:

Corn 400 lbs.

Oats 200 lbs.

Oilmeal 100 lbs.

Ration 3

Roughage:

Timothy or prairie hay.

Corn fodder.

Grain Mixture:

Corn or barley 100 lbs.

Bran 200 lbs.

Oats 200 lbs.

Linseed oilmeal or cottonseed meal 200 lbs.

Ration 4

Roughage:

Rutabagas 30-40 lbs., or mangels.

Clover hay.

Grain Mixture:

Oats 100 lbs.

Barley 100 lbs.

Bran 100 lbs.

Add 1 to 2 lbs. linseed meal to heavy producing cows.

Ration 5

Roughage:

Corn fodder.

Clover hay.

Grain Mixture:

Corn or barley 300 lbs.

Bran 100 lbs.

Oats 200 lbs.

Linseed oilmeal 100 lbs.

Ration 6

Roughage:

Timothy or prairie hay.

Corn fodder.

Silage.

Grain Mixture:

Barley or corn 200 lbs.

Oats or bran 100 lbs.

Dried beet pulp 100 lbs.

Linseed oil 100 lbs.

Amounts of grain fed to be regulated as suggested above.

INFLUENCE OF ALFALFA AND CLOVER HAY ON PRODUCTION OF COWS IN MEEKER COUNTY COW TESTING ASSOCIATION HERDS

ELWIN D. MYERS

Exact figures showing the difference in production of dairy cows receiving clover or alfalfa hay as a part of their ration as against cows that are fed only wild or timothy hay, are not common; so that the following figures from the Meeker County Cow Testing Association may be interesting and of some value.

Two hundred ninety-three cows in 19 herds finished a year's test November 1st, 1922. Of these 147 cows in 10 herds were fed in part on alfalfa or clover hay while 146 cows in 9 herds received only wild or timothy hay. All herds were fed silage.

The average production of the cows fed leguminous hay was 7,153 lbs. of milk and 260 lbs. of butterfat per cow. The average production of the cows fed only wild or timothy hay was but 5,067 lbs. of milk and 194 lbs. of butterfat per cow. A difference of 2,086 lbs. of milk and 66 lbs. of butterfat per cow in favor of leguminous hay.

The average profit above feed cost for the cows fed clover or alfalfa hay was \$63.20 while for the cows fed only wild or timothy hay it was but \$36.40. A difference of \$16.80 extra profit by feeding clover or alfalfa. This is from the butterfat alone and to this must be added the value of the 1,834 lbs. of extra skimmilk which at 30 cents per hundred would be worth \$5.50. This would make a total of \$22.30 extra profit thru the feeding of clover and alfalfa. A study of the feed cost per cow of the two groups shows that the average cost of feed was larger for those cows fed clover and alfalfa. This difference was due mainly to the fact that a ton of clover was figured at twice and a ton of alfalfa at three times the value of a ton of wild hay.

Assuming that the 146 cows not fed legume hay had producing ability equal to the legume fed group, the nine herd owners lost in the aggregate \$3,255.80

Clover and Alfalfa Give More Milk Than Wild Hay

A year's test of 147 cows fed on clover and alfalfa, with silage, shows a gain of \$22.30 per cow over 146 cows of practically equal breeding fed on wild hay and silage.

Writer of accompanying article believes the difference was owing to the difference in the ration.

Wild hay with corn and oats is a more costly ration than alfalfa, silage, corn, oats, and oil meal, in proper quantities.

by not having legume hay to feed to their cows.

A study of the records shows that the cows fed clover or alfalfa, while consuming a larger total amount of grain, did not consume more for each 100 lbs. of milk or butterfat produced.

The reader of this article will naturally ask the very pertinent question as to whether the cows in the two groups were of equal breeding. This is a question which is hard to answer positively as we are prone to assume that the highest producers are naturally the better bred. The number of high grade and registered cattle in the two groups was so near that the writer feels that the comparison is a fair one, and that the increase in production can not on the whole be attributed to anything but the alfalfa and clover. The writer is confident that any farmer can expect from fairly good dairy cows fed legume hay an increase equal to or greater than that shown by the above figures over what they would do if fed wild or timothy hay. He is the more inclined to this opinion from a consideration of the fact that most of the cows in this comparison that were fed clover and alfalfa did not have all they would eat of it. Most of the farmers had only a limited amount and were compelled to limit their cows to one feeding of it per day.

A comparison of the records of several individual herds is given below. In this comparison the herds selected were not chosen because they are highest or lowest, but an effort has been made to compare herds where the quality of the cows and the general care given were about equal.

Herd No. 19 consisting of 7 registered Holstein cows with an average butterfat production of 387 lbs. per cow, was fed silage, all the alfalfa they would clean up and an average grain ration of about 5 lbs. of oats, 5 lbs. of barley

and 3 lbs. of corn per cow daily in winter. No bran or oilmeal.

Herd No. 12 contained 7 registered and high grade Holstein cows, with an average production of 293 lbs. of butterfat per cow. They were fed silage, wild hay and corn fodder and an average daily grain ration in winter of about 5 lbs. of oats, 4 lbs. of corn, 1 pound of bran and $1\frac{1}{3}$ lbs. of oilmeal per cow. Both of these herds were fed grain while on pasture.

Herd No. 14 contained 21 grade Holstein cows. Herd No. 10 comprised 15 registered and high grade Holstein cows. Herd No. 14 averaged 268 lbs. of butterfat for year, herd No. 10 but 190 lbs. butterfat. Herd No. 14 was fed silage, clover hay and an average daily grain ration of $4\frac{1}{2}$ lbs. of oats, 1 lb. barley and $1\frac{1}{2}$ lbs. of bran. Herd No. 10 was fed silage, wild hay and an average daily grain ration per cow of about 2 lbs. oats, 4 lbs. corn, 1 lb. bran and $\frac{3}{4}$ lb. of oilmeal. Both herds were without grain while on pasture.

Herd No. 1 fed on alfalfa hay and Herd No. 9 fed on timothy hay, both were made up of grade Holstein cows. Herd No. 1 averaged 241 lbs. butterfat and Herd No. 9, 181 lbs. of butterfat per cow for the year. Herd No. 1 received an average daily grain ration of 4 lbs. oats, 2 lbs. barley, 1 lb. corn. Herd No. 9 was fed a daily grain ration of 4 lbs. oats, 2 lbs. corn, 1 lb. bran and $\frac{3}{4}$ lb. of oilmeal daily.

The highest producing cow in the association, producing 582 lbs. of butterfat in the year, was fed no bran, oilmeal or other purchased feed, but was fed all the alfalfa she wanted. The highest producing cow not fed alfalfa or clover produced 385 lbs. of butterfat and was fed considerable bran, oilmeal and beet pulp.

Conclusions

Cows produce milk and butterfat at a lower cost per pound when fed clover

TWO ESSENTIALS --IN-- LIVESTOCK PROGRESS

FEED AND CARE - - 50 per cent
BETTER BREEDING - - 50 per cent



WILD
ANIMAL

- PLUS -

FEED AND CARE
BREEDING

- EQUALS -

IMPROVED
ANIMAL



IMPROVED
ANIMAL

- MINUS -

FEED AND CARE
BREEDING

- EQUALS -

THE
SCRUB



LEARN TO FEED THEN BREED

GOOD FEEDING---More Home Grown Protein---Clover, Alfalfa, Soybeans
BETTER BREEDING---Use a Pure Bred Sire Capable of Transmitting
Production, Quality and Vigor

or alfalfa hay. Creditable records and economical production are possible with rations composed of home grown feeds.

Home grown leguminous roughages supply sufficient protein to meet the needs of good, average herds; reducing to a minimum the necessity of purchasing high priced protein concentrates.

The greater feeding value and yields of clover and alfalfa more than offset

the added labor and effort necessary to establish legume crops as compared with the cost of growing non-leguminous hays.

Continued prosperity calls for the maintenance of soil fertility. Efficiency in dairy production combined with a soil maintained in a high state of fertility demand the growing of a considerable acreage of leguminous crops.

LEARN TO FEED, THEN BREED

W. J. CORWIN, UNIVERSITY FARM

Learn to feed and then breed is a real motto for that great average mass of farmers scattered over these United States, including Minnesota. Unless the truth of this motto hits you squarely between the eyes, you will not be interested in the further reading of this article. Suffice it to say that all the factors and influences which have created the great difference between the original wild ox and his descendants which we have on our farms today may be tied up in two packages—FEED AND CARE, BETTER BREEDING AND SELECTION. These two factors go hand in hand. Either is almost useless without the other and high authorities place a 50-50 value on their relative importance.

Most people keep cows for the profit they can make on them. Only rich men can afford to keep cows for pleasure. Yet many of our farmers are getting neither pleasure nor profit because they lack one or both of the above requirements. Some farmers are fairly good caretakers and feeders but they have a poor grade of animals to make a profit on the feed and labor furnished them. Other farmers spend good money for well bred and efficient animals but give them scrub feed and scrub care and then disgustedly say there is nothing to the dairy business.

What's wrong? Surely not the well selected and efficient animals, the soil, or the crops that we could grow. Not these factors. Perhaps it's the man who is running the business. Turn the stock out in the barnyard in February or March so one may see them as he passes on a train or in an automobile and he can tell at a glance what kind of a feeder, what kind of a caretaker and what kind of a manager is running the business at that farm.

What's the remedy? Better home grown feeds, as comfortable and inexpensive shelter as possible and efficient animal machines to manufacture during the fall, winter and spring the feed that one has spent all summer in raising. Just good judgment and common sense management based on the fact that our dairy animals serve mainly to convert a great mass of plants—stover, hay, grains, legumes, silage, etc.—into a more nutritious and usable form of human food. And that from the cold blooded business standpoint, it pays to feed so the animal will be working for you to her full capacity every day in the year instead of five or six months as so many of the cows in this state are doing today.

But how is a man going to furnish good feed? Raise it. We should feel when the spring seeding is done that our

Good Feeding Good Animals

Two essential factors for success
on the dairy farm.

Good feeding doesn't count for
much with scrub cows.

Good cows do not count for much
with scrub care and scrub feeding.

*Feeding and care, with better
breeding and selection, give
assurance of profit.*

feeding plans for the next winter are sealed up. Most farmers feed what they have on hand and the kind of feeds they have in the fall is determined by the crops that we planted in the spring. Too many men fail with livestock because they are poor crop men and poor general farm managers.

Good feeding of dairy cows begins with good farm management plans, with 15 to 20 per cent of tilled land in legumes—clover, alfalfa, soy beans—with some silage or succulent feed, with a constructive rotation of crops that incidentally improves rather than depletes the soil fertility and with the right amount of all these feeds on hand in the fall to last until good grass pastures are ready in the spring. Too many of our cows are in the position of an automobile half way up the hill and no more gas in the tank. All they need is a little more good feed and care and they will ascend on high delivering the profits at the top of the grade but never half way up. Any animal that will not respond profitably to good feed and care should be shot on the spot to save expense.

Incidentally there is a marketing angle to this feed and care problem. Almost two-thirds of all the plants that grow upon the land in Minnesota is manufactured through animals for human consumption. Farm animals, therefore, make the first direct market for two-thirds of the farmer's crop and the

labor in producing them. Here is a market problem over which each farmer has direct management and control. If he does not give the proper feed and care to his animals then he is failing to control one of the biggest market problems—namely, the efficient selling of his farm feeds which must be manufactured through good livestock to secure the most profitable returns.

When the common cow is forced to produce all she can, when the farmer knows that he is a good feeder and caretaker, then he is ready to invest in high grade and purebred animals. While every farmer should use a purebred sire of good backing, he should know how to feed to advantage and he can gain this experience on his present stock. As soon as he has confidence in his own feeding ability his desire for better stock automatically takes care of itself.

There is an old saying, "that the eye of the master fatteneth the cattle." That statement is just as true today. Some men may spend a lifetime breeding and selecting and improving our livestock but if these animals are sold or turned over to men who are poor feeders and poor caretakers, then most all that effort is eventually lost. One of the crying needs in the livestock game today is better feed and care by the average keeper of livestock and it goes without saying that he should spend this feed and care on efficient animals if he expects real profits.

RAISING CALVES ON SKIMMILK

T. W. GULLICKSON, UNIVERSITY FARM

The wise dairyman knows that if the production of his herd is to be increased or even maintained he must select and raise the heifer calves from the best cows in his herd. It is only in this way that he can obtain heifers from ancestry of known productive capacity for replacing discarded animals in his herd. While the opinion has long been held that whole milk is the only food suited to the needs of calf raising, investigations at several experiment stations have fully demonstrated that as good or even better calves can be raised on skimmilk and at about one-third the cost. The skimmilk fed calf, it is true, usually does not look quite as sleek during the milk feeding period as the one raised on whole milk, however, at the end of a year it is almost always the better one of the two. This is because the skimmilk fed calf usually becomes accustomed to eating grain and hay earlier in life and consequently the change in food at weaning time does not cause as great a set back in growth.

Feeding Before Birth

The raising of a good dairy calf might properly be said to begin before it is born. The food elements necessary for the growth and development of the calf must first be digested and assimilated by the mother before it can be transmitted to the calf. It is evident that if the cow does not receive food enough to keep herself thrifty and in a healthy condition both she and her calf must suffer. Many dairymen handicap themselves at the start by improper feeding of their pregnant cows. Such cows should have an abundance of palatable and

succulent feed in order to insure a good, healthy, thrifty condition.

But while the welfare of the unborn calf may be influenced by the manner of feeding the mother, the difficulties of calf raising usually begin after the calf is born. Responsibility for its further development is then transferred to the owner and that is when the first real trouble begins.

Must Receive Colostrum or First Milk

The calf should be left with its mother during the first one to four days of its life so that it may receive the colostrum or "first milk." Colostrum is nature's physic. It possesses certain properties which stimulate the calf's stomach and other organs to proper action and for this reason the young calf should always receive its mother's milk at first.

There is no well defined rule that can be applied in caring for the calf during the first few weeks. This period is probably the most critical one in its whole life. Then it is that the start is made, and the future development of the calf depends a great deal upon the kind of start it gets. It requires the exercise of a lot of care and attention to give the calf the right kind of a start. The matter of most importance at this time is to keep the calf in a healthy, thrifty condition.

Teaching the Calf to Drink

After the calf has been taken away from its mother it should be taught to drink. A calf with a full stomach is not a good pupil. To get the animal in the proper mood take it away from the mother and at the end of twelve hours it will be hungry and



usually ready to drink milk from the pail quite readily. In feeding the calf the feeder should use the same judgment as would be exercised in caring for the human infant. Cleanliness should always be observed, the milk should be sweet and at a temperature of 90 degrees F., fed often and in small quantities. There is much more danger from over-feeding a young calf than from under-feeding it. Feed from six to twelve pounds of whole milk daily, depending on the size of the calf. During the first two or three weeks the amount should be divided into three equal parts and fed at as many equal intervals during the day, after that two feeds daily will be satisfactory if the calf is in a good thrifty condition.

When to Begin Skimmilk Feeding

When the calf is from two to three weeks old and in a good healthy condition, the ration may be changed to one of skimmilk. The transfer from whole milk to skimmilk should take place gradually, requiring at least a week to make the change. Skimmilk feeding should continue until the calf is about six months old and longer if the supply of milk is plentiful. Usually the maximum amount fed per day need not exceed 16 pounds, but in case of exceptionally large thrifty calves a larger amount might be utilized with benefit to the calf.

Teach the Calf to Eat Grain and Hay

The calf should be taught to eat grain and hay at an early age. Usually if the calf is with other calves it will learn from them. When once it begins to eat grain the calf is well started. At first the calf should receive all the grain it will eat, but later the amount should be limited. By the time the calf is six weeks old it will eat about one-half pound of grain per day. As the calf grows older, larger quantities will be consumed, but at no

time up to the time the calf is six months old is it necessary to feed over two pounds a day.

The first grain fed might be either cracked corn or whole oats or a mixture of the two. Later a mixture of several ground grains can be fed. Almost any combination of the ordinary farm grains will prove satisfactory when fed along with the skimmilk. The idea that linseed oilmeal must form a larger part of the ration of calves raised on skimmilk than of those raised on whole milk is erroneous. Skimmilk differs from whole milk only in that most of the fat has been taken out. It consequently contains a proportionately higher percentage of protein than does whole milk, and for this reason high protein concentrates, such as linseed oilmeal are not required to any greater extent in the ration. What the ration of the skimmilk calf really needs is something to take the place of the butterfat that has been removed from the milk received. In most sections of Minnesota corn no doubt is the cheapest source of this fat. For this reason the ration of the skimmilk fed calf should contain a considerable proportion of corn. To give variety a combination of two or more farm grown grains should be fed. Besides the grain ration, calves should always receive all the clover or alfalfa hay they will eat, except in the case of digestive disturbances or extreme looseness, when timothy should be provided. At such times the amount of milk fed should also be decreased by as much as one-half or even more.

Care and Management

In addition to the feeding of the calf is the matter of its care and management. Experience has demonstrated that all the efforts of proper feeding may be wasted through faulty management. One of the most common

mistakes in the management of the calf is to turn it out on pasture before it is at least six months of age. It has been found that calves will do better when kept in the barn during the early period of their lives. Until a calf is at least three or four months old its stomach is not adapted to handling grass. Also being subjected to the heat of the sun and the torment of flies causes the calf to become unthrifty. The calf should be kept in the barn in a clean, well-bedded stall where there is plenty of light, and where fresh water is available at all times.

Scours or Diarrhoea

The most common disease among calves is diarrhoea or scours. This disease results from a disturbance of the digestive tract and is most frequently caused by over-feeding. Irregular feeding, sudden change of feed, feeding dirty milk or sour milk, or feeding the milk in dirty pails and using dirty feed boxes may also bring on the trouble. As is true in the case of other preventable diseases, it is easier to prevent the disease than to cure it. At the first signs of the disease being present the affected calf should be separated from the others and the pen carefully disinfected. The feed should be reduced immediately by at least one-half, milk buckets cleaned and sterilized, and feed boxes disinfected. By following this procedure the calf usually recovers its normal health in a few days. For the treatment of calves more seriously affected which do not yield readily under this method of handling, the reader is referred to the article found elsewhere in this number of the annual entitled "Diseases of the Dairy Cow" by Dr. C. P. Fitch, Chief of the Division of Veterinary Medicine, College of Agriculture, University of Minnesota.

Summary

Raise only the best heifer calves from the best cows in the herd.

The raising of a good dairy calf begins before it is born. Feed the mother well.

Give the calf the colostrum or "first milk" from its mother. Colostrum is nature's physic.

Give the calf not more than three pints of milk the first feed. Be careful not to overfeed at any time.

When the calf learns to drink give it from 6 to 12 pounds of whole milk a day, depending on its size. Increase the amount as the calf grows.

Feed three times a day during the first two or three weeks.

Begin skimmilk feeding at two to three weeks of age, or later if the calf is not in good thrifty condition. Wean at six months of age.

Feed not to exceed 16 pounds of milk a day at any time unless calf is exceptionally large and thrifty.

Commence feeding grain and hay when calf is about 2 weeks old.

The first grain fed may be either cracked corn or whole oats or a mixture of the two.

Almost any combination of the ordinary farm grown grains will prove satisfactory when fed along with skimmilk.

Feed not to exceed two pounds of grain a day up to the time the calf is weaned.

Give the calf all the clover or alfalfa hay it will eat all the time.

Do not turn the calf on pasture until at least three or four months old.

Keep the calf in the barn in a clean, well-bedded, well-lighted stall.

Provide the calf with fresh water to drink.

Be careful not to bring on digestive disturbances thru careless methods.

SUNFLOWERS FOR SILAGE

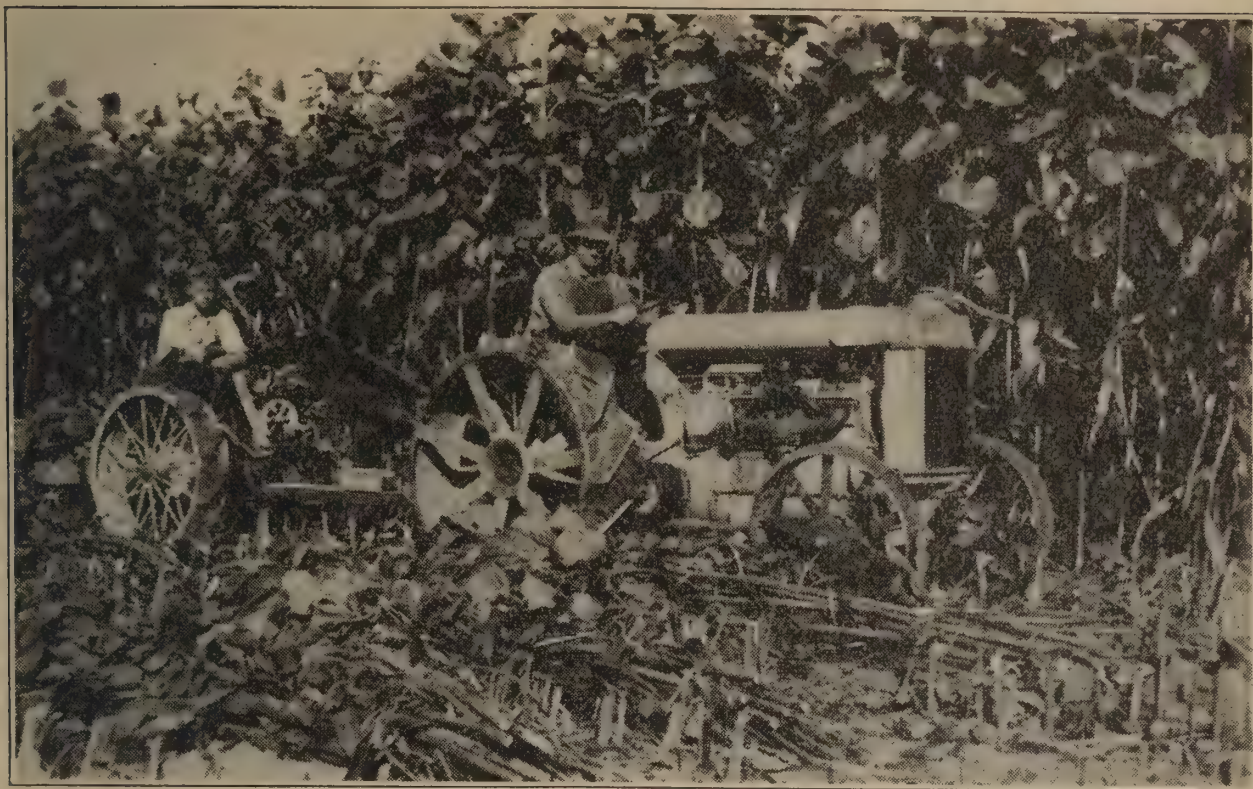
JAMES EWALD, KOOCHICHING COUNTY

Two years ago I was figuring on putting up a silo as I have run a dairy farm here for 10 years and the problem of raising the necessary feed became quite serious. I had been in the dairy business in Minneapolis before coming here. There I had had a silo but it was filled with corn of course. I was thinking of putting up one here, but did not believe I could depend on corn as far north. So I set out to find something else. We raise good oats here, but my small acreage of cleared land did not permit that. Well, the only thing then was sunflowers; having read in the farm papers that they used them a good deal in Montana and Canada, I thought I would try them out. I put in about 1 acre on some poor land I had rented and the result was wonderful. Then I was satisfied that they would grow. The next year, 1922, I bought a triple wall silo from the Independent Silo Company in St. Paul, as it takes a good warm silo in this part of the country. Size of silo was 14x36 with a 4 foot jut. Then I put in 9 acres of sunflowers on some good rich land where I had potatoes the year before. They grew so tall that I thought I would never get them cut, but on the enclosed picture you can see how I did it. (Deering binder and Fordson.) Filled the silo with a Gehl N. 17 cutter. The average length of the flowers was from 12 to 15 feet. I planted

them at the rate of 7 pounds of seed to the acre. At first when I started feeding, the cows did not like it, but by giving them only a little silage and putting a little feed on top of it, they soon learned to eat it. I forgot to say that I drilled them in with a common corn planter 3 feet, 4 inches apart and cultivated and handled them as you would corn and did not cut them until the frost came. It was Sept. 15th. A good frost does not hurt them, if you cut them soon after. They are plenty moist for filling even after a frost. After the cows got onto them, they ate them very readily and I fed them about 30 to 40 lbs. per cow. That of course cut the hay they ate in more than half. My feed I also cut in half, so good milkers I was feeding 6 to 8 lbs., young stock none at all. Little calves 2 months old liked it very much with a little feed.

This year I have 8 acres of sunflowers and 3 acres of corn, Northwestern Dent, and have a stand of corn that is hard to beat. It was 6 feet high the 10th of July and is fully 9 to 10 feet now with 2 ears on every stalk. I am going to mix it when I fill the silo, about 2 loads of sunflowers and one of corn.

This is about all I have got to say in regard to sunflowers. There is no man with a herd of cattle in this part of the state that goes wrong in putting up a silo and filling it with sunflowers.



How the Sunflowers Were Cut.

SOME SUGGESTIONS ON BREEDING DAIRY CATTLE

C. H. ECKLES, UNIVERSITY FARM

The question of getting efficient cows for immediate use is one of selection and financing, the question of having better cows for the future is one of breeding.

It is generally conceded that, taking all our dairy cows into account, we have to raise at present three cows in order to get two that are satisfactory. In other words, about one-third of the cows raised for dairy purposes are culled out as unprofitable when records are kept. This results in the loss of much good feed, not only in raising these unprofitable animals but in keeping them until their worthlessness is proved and they can be culled out. The objective point of our breeding operations should not be to raise one or two great producers but a high percentage of good producers. We should look forward to the time when, as a result of more skillful

breeding, instead of only two out of three cows raised being satisfactory, four out of five will be up to standard and later possibly even nine out of ten. As the result of experiments covering nine years and of long observation, my judgment is that the good cow or the inferior cow, so far as milking ability is concerned, is born what she is and not made what she is by feed or care during the growing period. If the difference between a cow having a capacity of 10,000 pounds of milk a year and another that barely reached the 4,000 pounds class is one of parents, it certainly behooves the dairy farmer to see that the proper parents are provided. It should be remembered that the cow has two parents and both should receive attention. The tendency is evident, especially in recent years, since the keeping of records and the culling of

*Eighty-One
Dollars More
for Each Cow*

ANNUAL income of dairy herd at
North Central Agricultural Ex-
periment Station increased \$81.00 for
each cow

by

the introduction of

Purebred Sires

C. H. Eckles discusses breeding—
read what he has to say.

cows has been strongly emphasized, to count too much upon this culling of inferior cows to improve the coming generation. By all means, raise the heifers from the best producing cows, but do not count too much on these heifers duplicating the records of their dams in milking ability.

Improvement Depends Upon Better Blood

Every owner of livestock who gives careful thought to the problem of herd improvement realizes that the main chance for the rapid improvement of a herd lies in the introduction of better blood through the sire. No one would recommend the purchase of a high class cow and a medium bull as a means of improving a herd. Every animal raised gets half of its inheritance from the sire. From the first cross with a purebred bull the offspring of a scrub herd have one-half improved blood. A second cross raises the proportion to three-fourths and a third seven-eighths. When this proportion of improved blood is reached the animals have essentially the characteristics of the breed represented by the improved sires, and if the inferior animals are culled out the dairy qualities should be practically the same as for purebred specimens of the breed.

An Iowa Experiment

One of the most striking demonstrations regarding the value of a purebred bull as a means of increasing the productive capacity of a herd is shown by results obtained by the Iowa Experiment Station. A group of typical native cows was brought from an isolated locality in Arkansas. After reaching the Experiment Station these cows received the same treatment as the regular dairy herd. The original cows with a total of 74

lactation periods averaged 3991 pounds of milk and 187 pounds of fat. Thirteen daughters of these cows by purebred bulls averaged 5566 pounds of milk and 253 pounds of fat. Cows of the second cross averaged 358 pounds of fat, an increase of 130 per cent in milk yield over the original scrubs.

Experience at Grand Rapids

Another instructive example of what can be done in the way of building up a herd by the well known methods of selection, breeding and good feeding is shown by the results from the herd owned by the Grand Rapids Sub-Station of the University of Minnesota. In 1905, A. J. McGuire, well known among all the dairymen of the state, started a project to build up a dairy herd under practical farm conditions, not under conditions as they would be at the University Experiment Station, but under conditions absolutely as practical as could be obtained on any farm in that or any community. The cows were milked twice a day. They fed feeds grown on the farm, except perhaps, for the purchase of a little high protein concentrate. The start was made with cows, most of which came from the South St. Paul Stock Yards and others born in the community. They were plain cows of no particular breeding. He started in to do exactly what I have suggested. These foundation scrub cows were given good feed and care. They had the right kind of a ration. It included a succulent feed, legume hay and contained sufficient protein. These cows were well housed in the winter. A purebred Guernsey bull was purchased. Undoubtedly the same success would have followed the use of any other dairy breed, but Mr. McGuire used a Guernsey. The first year with the original cows they got an average of 196

GOOD COWS BORN--NOT MADE

Feeding and Care during the growing period won't make up for the right kind of parents, if high milk production is the breeder's aim.

Three cows have to be raised in order to get two good ones—This means useless waste of feeding.—Proper breeding ought before long to bring four good cows out of every five.

—C. H. Eckles, Dairy Division,
Department of Agriculture,
University of Minnesota.

pounds of butterfat. Ten years later, after replacing most of the original cows with heifers from the purebred sire, and culling out the poor individuals, the average production was 280 pounds of fat. By further culling and replacing of cows by heifers raised in the herd, Mr. Bergh, who took over the management of the herd at the end of ten years, was able to get a production of 358 pounds of fat by the end of 13 years from the time the herd was established.

Let us analyze these figures. Assuming the cows to be milked an average of six years, the total increase in production per cow by the cows having improved blood over the original is 15,102 pounds of milk and 972 pounds of fat. At 50 cents a pound for fat the increase in income would be \$480. Against this it would be fair to charge the cost of additional feed that would be required. At \$30 a ton for feed a fair estimate would be \$95 additional for feed, leaving \$375 for the lifetime income for the cow in excess of that of her dam as the result of having improved blood. The use of purebred bulls in this herd increased the annual income \$81.00 per cow as compared to that by the original cow.

Similar examples could be gathered from many records. For example, the records of a bull association in Maryland give the production of 21 cows in comparison with that of their daughters by a purebred bull of a dairy breed. The dams averaged 319 pounds, the daughters by the pure bred bull 263 pounds of fat, an increase of 62 pounds per animal yearly. At 50 cents a pound for butterfat the blood of this purebred bull in this daughter was worth \$30.00 a year.

With the pure bred herd even more is at stake when the herd sire is selected than when the herd is a grade one used only for producing market products.

Furthermore, with each progressive stage of development the problem of getting a sire that will result in improvement becomes increasingly difficult. In fact in the highly developed herds it becomes a serious question to select an animal for breeding purposes good enough to hold the advancement that has been made. While almost any pure bred bull of good inheritance will increase or at least maintain the standard of an unselected grade herd, only an outstanding bull will even maintain the standard of a highly developed purebred herd. All successful breeders recognize that the whole future of the herd is at stake when the bull is selected. As soon as one animal is decided upon they begin considering what to use next.

In fact, the more a man studies the question the more he realizes that the whole future of his herd is at stake when he buys a bull. To use a bull with the wrong combination of heredity in a good dairy herd is almost as great a calamity as to burn down the barn. Two or three of the wrong kind in succession will almost put a herd out of business, while the right bull will make the herd famous.

If we study the history of any successful breeder we generally find that his success was based upon one or more breeding animals. This was true as far back as the time of the Collings Brothers, the great Shorthorn breeders of the eighteenth century. It is true today of the great breeders of dairy cattle.

Selection of the Sire

The selection of the sire is generally made upon one or more of four points: 1. Breed; 2. Type and looks; 3. Pedigree, including in this all facts with reference to ancestry such as milk records; 4. Character of offspring. Naturally in most cases more than one of these points are taken into account. For example, the most common basis of selection is by breed, pedigree and type combined.

Bulls Judged Best By Their Offspring

Success of the great breeders has been
founded on that principle

It is wise to keep a bull until results of
his breeding are seen

First of all the bull selected should be a purebred of the breed to which the cows belong or, in case grading up is to be done, of the one selected as best suiting the purpose. When the first step is being made in grading up a herd it is often necessary and advisable to cross breeds. However, crossing breeds with the expectation of getting better results by that means is a great mistake. Crossing distinct breeds defeats the very object for which the breeds have been developed.

The leading dairy breeds represent the best effort of breeders for generations and certainly it is poor judgment not to make use of what has been done in the past. Starting with a pure breed is beginning where the breeders of the past have left off. Trying to build up a herd without making use of improved breeds is refusing to recognize the years

of labor by other breeders and undertaking to do it all yourself. However, buying a certain bull merely because he belongs to the breed you have decided to use is hanging a big weight by a small string. The fact that the animal has "papers," or in other words is registered, should be insisted upon to be sure, but this is only the starting point for the qualifications which should be demanded in considering a candidate for the all-important position of herd sire.

In the judgment of the writer, the tendency is to attach too much importance to the looks of a bull. Undoubtedly it is possible to judge to a considerable extent by the looks of a beef-bred bull as to the value of his sons and daughters as beef animals. It is also possible, unquestionably, to draw some conclusions from the looks of the dairy-breed bull as to the probable type and conforma-

tion of his daughters. However, milk production is a function of a gland and not of bodily conformation. For this reason the appearance of the bull gives far less basis for judgment as to the milking qualities he will transmit than it does to the probable type of his daughters.

However, I would by no means advise that the looks of the bull be ignored altogether, since we want handsome cows if we can get them; but first of all we want milk producers. I would insist that the bull be medium to large for the breed he represented and full of vigor and nervous energy, even though he does occasionally use it in a manner we do not appreciate. I would want him at least reasonably good type, but I would not place that first or make my decision as a rule on that point. Many men buy bulls, especially those that command only a moderate price, without going farther than knowing that the animal in question is purebred and is a good looking animal.

A highly developed milk-producing function may go with a beautiful conformation of body, but not necessarily so. In other words, to speak plainly, I do not believe the type of the bull has much to do with the milking characteristics of his daughters, and selection upon looks alone would be a mighty poor basis upon which to select a bull to head a dairy herd.

A large majority of the bulls used are, and should be, selected largely upon pedigree and the milk records of their ancestors. Pedigree with some attention to individuality is the best means of selecting a bull next to that of judging by his daughters. The experienced breeder of purebred cattle has usually given some attention to the matter of pedigrees and knows how to interpret them. The man who has not had this opportunity to become familiar with the sub-

ject should either do so or get someone with this knowledge to assist him when he makes his purchase.

A man who has a dairy herd already highly developed should, whenever possible, find a bull for a herd sire that has already demonstrated by his daughters his ability to transmit the dairy qualities wanted. Unfortunately the common practice followed by so many of using a bull two years and then selling him to the butcher, makes it impossible to judge of the value of most bulls until too late. The movement under way in many places of forming bull clubs offers great possibilities along this line. By the exchange of bulls among the group of members as planned by these clubs, it will be possible to retain a bull until he is old enough to show his breeding value. In this way bulls will be discovered that are wonderful breeders.

A study of the method of the great breeders of the past will show that they followed this plan of judging a bull more by his offspring than by his ancestors, and this was unquestionably one of the main reasons for their success. Whenever possible it is wise to retain a bull until the results of his breeding can be ascertained. Then if his daughters are not satisfactory the sooner he is sold the better. There always exists the possibility of finding a great bull like Hengerveld De Kol, Golden Lad, or many others of wonderful prepotency.

The bull known to transmit dairy qualities of high order is appreciated today as never before and is certain to bring a long price when once his value is known. As a rule it is only the breeders of purebred cattle who can spend the necessary time and money to locate a bull of this class. The smaller breeder, however, should always be on the lookout and occasionally a bull of this class may be located where his value is not appreciated.

The Opportunity for the Purebred Breeder

If a man was thinking of going into any particular line of business, he would naturally study the supply of the commodity he proposed to sell or manufacture, and the number of prospective customers. A man considering the advisability of going into the pure bred business in Minnesota and who makes such a study of the situation would come to the conclusion that the opportunity for the purebred breeder is unquestionably here. There are plenty of prospective customers who will buy if the goods are properly advertised and sold.

The census of 1920 showed a total of 2,080,627 dairy cattle of all ages in Minnesota, of these only 33,668 or 1.9 per cent were purebred. I am not one who believes that we can hope for the time to come when even a majority of our cattle will be purebred. In fact I realize that for the majority of producers of milk and butterfat the practical herd will continue to be a well selected high grade herd with a purebred sire at its head. However, the time must come when every herd will be headed by a purebred sire. The present deplorable condition of only 16 per cent of purebred sires in Minnesota must not continue. In 1920 there were 68,956 bulls used in the dairy herds of the state, of these only 11,033 are purebred, leaving in round numbers 57,000 scrub and grade sires to be replaced. Is there a place for the purebred breeder? It certainly looks that way to me. I figure that at least ten per cent of our dairy cattle, five times more than we have now should be purebred merely to supply the purebred bulls needed. Purebreds are the seed stock for the grade herds which will continue to supply the bulk of the dairy products for the market. The purebred breeders have taken over this great responsibility of maintaining and improving the breed.

In these herds all real breed improvement is made and by the distribution of seed stock, largely in the form of purebred bulls, these improvements gradually spread to the great mass of grades.

Possibilities of a Purebred Herd

To a person born with a love for animals, business ability of a high order, and the patience to await results, the purebred business offers exceptional opportunities. Many examples could be cited. The author at one time purchased four foundation cows for the institution with which he was connected at the low price of \$600. No other females were purchased. At the end of fifteen years it was found that surplus animals had been sold to the amount of \$13,800, and that forty-four females were on hand having an inventory value of \$17,000. The value of the milk is not included in these figures but was sufficient to pay expenses under practical conditions, making the purebred herd a splendid investment. A Guernsey breeder reports a herd of twenty-one purebred animals on hand, all descended in ten years from one cow. Forty-one purebred calves were dropped on the farm during the ten year period.

Investigation will show that nearly all successful breeders started in a small way and gradually grew into the business developing their herd and extending their prestige as breeders from year to year. The purebred business is of slow growth and cannot be forced. The young man going into business should not count too much at first on the sales of purebred animals. He should make his plans with the idea of paying the operating expenses from the sale of dairy products, and not from the sale of breeding stock. It requires at least ten years for a purebred breeder to become established, and for his herd to become known to the extent that his stock will be in demand at good prices.

SELECTION OF DAIRY COWS FROM THEIR APPEARANCE

W. E. PETERSEN, UNIVERSITY FARM

The industry that is to survive and prosper must use machinery that is adapted to the purpose for which it is used. Successful industrial concerns frequently discard machinery, not because it is worn out but because more efficient machinery has been developed that will do the same amount of work for less cost.

Dairying is a business the success of which depends upon the efficiency of the machine used as much as in the case of any other industry. The cow is a machine whose efficiency is measured by the number of pounds of milk and butterfat she can produce from a given amount of feed. The degree of variation in efficiency of production between different dairy cows varies as much if not more than any other machine. She is also a machine that has seen as wonderful a development as almost any other machine.

Individual cows, families and breeds have been developed that produce several times as much milk and butter as did the old cow of many years ago. Yet on our farms today are kept thousands of cows for dairy purposes that are relics of the old time inefficient machine. These misfits consume feed and require labor and care that would produce much more milk and butter and many times as much profit if given to more efficient machines.

Most of these inefficient dairy cows can be eliminated as such from their external appearance. They have stamped in their make-up "not adapted for dairying." Just as surely as the poor cow has a stamp of lack of ability to produce economically so the good cow bears a stamp of her ability "adapted for dairying."

How is this stamped upon the cow and how can it be read?



"NOT ADAPTED FOR DAIRYING"

This cow needs no testing or record keeping to show that she will not produce at a profit. She lacks in dairy conformation, capacity for feed, mammary development and style and general appearance. No amount of feed or care will make a profitable producer of this cow.



"ADAPTED FOR DAIRYING"

A look at a cow of this type is all that is necessary to know that with the proper feed and care she is capable of large and economical production. Note the large barrel giving room for feed, splendid dairy form, large mammary development and indications of constitution and vigor. She also has a pleasing appearance.

In order to be able to read these "stamps" one must analyze the relation of the different parts of the cow to milk production. For this purpose the cow should be considered from the following standpoints:

- a. Capacity for feed.
- b. Dairy form.
- c. Constitution.
- d. Mammary development.
- e. Style and general appearance.

Capacity for Feed

The dairy cow functions as a machine for the making of milk from feeds not adapted for human food. Therefore to be a large producer she must be able to consume a large amount of feed. This ability is indicated mainly, by a large middle. A cow should therefore have a long, deep body with ribs rounding out and forming a circular body from rear or front views rather than a narrow one.

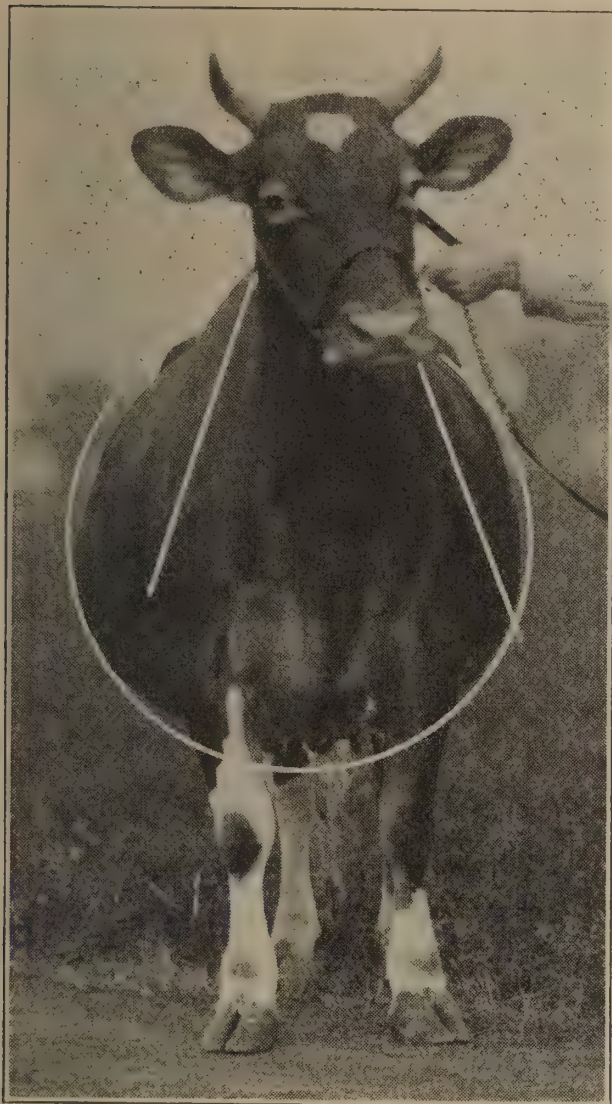
A wide nostril is also considered a good indication of capacity for feed; but unless accompanied by a large middle, should not be taken as a sign of great feed capacity.

A thin, pliable hide with fine hair is a good indication of good digestion abilities and therefore economy in the use of feeds.

It is certain that a cow with a short, shallow body and flat rib cannot be a good producer no matter what her other qualifications may be, as she will not be able to handle enough feed.

Dairy Form

A cow may have a great feed capacity and actually handle a large amount of feed and yet not be an economical producer of milk. She may be so constituted as not to use the feed she consumes for the production of milk. In other words she may use the feed for putting on flesh. Dairy



A STRONG CONSTITUTION IS ESSENTIAL FOR CONTINUED HIGH PRODUCTION

While the shoulders should form a wedge the ribs should round out giving plenty room for the vital organs. The more nearly that a circle is formed by the ribs the more room there is for both feed capacity and for the vital organs. It is also desirable that the front legs should be far apart giving a wide chest floor.

form is that about a cow which indicates a tendency toward production of milk rather than flesh from the feed consumed.

The first essential of dairy conformation is absence of excess flesh.

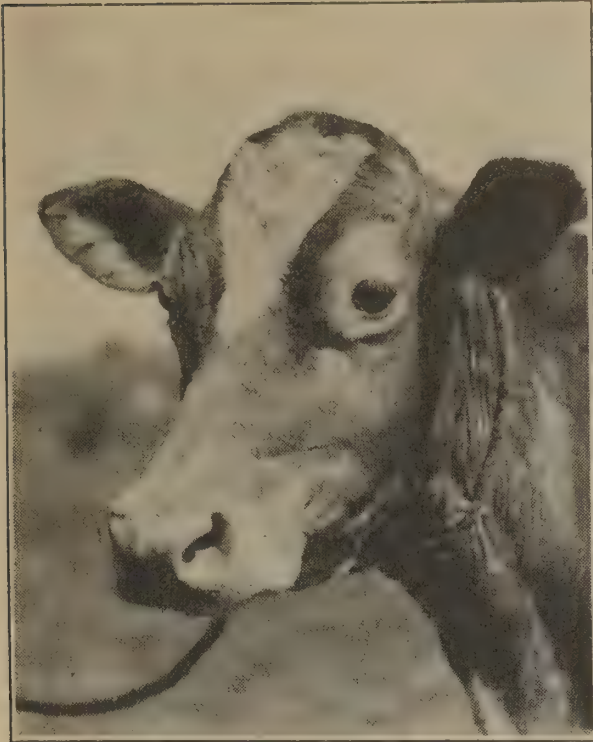
The dairy animal should have a body which presents three wedges as compared with the beef animal where the same lines should present rectangles. The first **WEDGE** is **OVER THE SHOULDERS**. Freedom from excess flesh or coarseness forms

shoulders which come to a point at the withers. Due to the desired depth of body and development of udder the top and bottom lines, if extended, should form a wedge with the apex or point a short distance in front of the head. A third wedge should be formed by the lines of the sides drawn from the hook bones to the withers, with the point at the withers.

Others Parts Clean Cut and Free From Coarseness

All the parts of the dairy animal should be clean cut, well defined and free from coarseness, or beefiness. The **head and face** should be of neat chiseled-out appearance free from too prominent and coarse cheek bones. The **neck** should be long, slender and neatly joined to the head and shoulders. It should be free from heavy dewlap. The **throat** should be neat and free from heavy folds of skin. **Shoulders** should be free from heavy covering of flesh and should blend smoothly with the rest of the body. Large, prominent shoulders are indications of coarseness. The **legs** should have bone of good size yet free from large joints, or coarseness. The muscles and tendons of the legs should be rather easily defined. The **backbone, hook bones, pin bones** should be prominent and free from flesh. The **thighs** should be thin and curved so as to leave room for udder. **Ribs** should be rather wide apart and free from covering of flesh.

The animal must have an active disposition. She must be alert and active in order to perform the work that she should. Large, prominent eye, erect carriage and free and easy gait in walking are indications of active disposition. Care must be taken not to mistake nervousness and excitability for desired active disposition. While the dull, sluggish animal is undesirable because of her indiffer-



A DESIRABLE DAIRY HEAD

Note the wide, dished forehead, large prominent eye, clean-cut face of medium length, large open nostrils and wide muzzle.

ence toward consuming feed, the extremely excitable and nervous animal is equally undesirable because of difficulty in handling.

In judging for dairy conformation care must be taken not to mistake a thin beef cow for having a lack of tendency toward putting on flesh nor to mistake a dry dairy animal in good condition of flesh as having a tendency to put on flesh. A beef cow that has been underfed will have lost flesh; giving her the angular and triple-wedge shape of the dairy animal; but she will lack in development of the milk secreting organs.

Dairy heifers nearing freshening time and dry cows will put on flesh and assume somewhat the form of the beef animal. However, after freshening they will rapidly lose this flesh. In such cases they usually become rather broad over the withers which is frequently mistaken for coarseness. The student of judging should learn to differentiate between coarseness

and the accumulation of fat prior to freshening. If the animal is dry, and is otherwise free from coarseness and gives promise of good mammary development, only a small cut should be made for fleshiness.

Constitution

A cow, to be most profitable must not only be capable of heavy production, but must keep up the heavy production for entire lactation periods, and year after year with only short periods of rest; and in addition produce a calf each year for a number of years. A cow may have excellent dairy conformation, great capacity for feed and an excellent development of milk secreting organs and yet not be a great producer for any length of time because of lack of the necessary vigor to continue to perform the hard work which she must do, and to overcome adverse conditions.

It requires a large amount of work to produce a large quantity of milk. Milk is manufactured in the udder from nutrients carried there by the blood from the digestive tract. This means that the greater the production the larger the blood flow, and with that, greater respiration to purify the blood so that the heavy milking cow is not only working hard in masticating and digesting feed, but also requires large amounts of energy for the vital processes.

To do this work under ideal conditions requires good vigor, but in addition the heavy producer is confronted with adverse conditions that demand additional stamina. She is apt to suffer from lack of proper nutrition, or from over-feeding of heavy concentrates. Extremes in temperature, or attacks of various diseases are other strains which she is subject to, all which require strength of constitution to be able to be withstood.

Constitution is indicated by the general vigorous appearance of the animal and by well developed respiratory and circulatory organs. For this there must be plenty of room in the chest cavity which is secured by a wide chest floor, depth of chest and spring or rounding of the fore-ribs. It stands to reason that the more circular the chest is the more room there is for the heart and lungs. Large, open nostrils are a good indication that the air passages to the lungs are ample.

In judging spring of rib care must be taken not to mistake a covering of flesh over the ribs as spring of the ribs.

Mammary Development

The mammary system consists of the udder, milk veins, milk wells, teats and veins on the udder and inside of the thighs. Of these the udder is the milk secreting gland and the others are accessories.

The udder consists of glandular tissue, storage reservoirs and connective tissue. The glandular tissue is that part of the udder which actually is concerned in the manufacture of the milk. The milk reservoirs are the parts where the milk is stored and include the ducts from the glands. The other tissues have little or no function in the making of milk. The efficient udder must have a large percent of glandular tissue, which, together with the ducts and reservoirs, give it a spongy texture.

It is therefore not only necessary that the udder be large, but that it has a spongy texture or when milked out that it collapses. A large udder may be made up largely of other tissue than that which produces milk and may therefore mislead the judge unless it is carefully examined as to quality.

Shape of Udder

In addition to size the shape of the udder is of great importance. The udder should be long and wide and appear to be of one unit with convenient sized teats placed wide apart. It should extend far forward and high up between the thighs with the front and rear halves equally developed. Attachments in the rear and front are important, for unless the udder is well supported, it will have a tendency to drop down with age, forming what is known as a "pendulous udder" which in addition to being unsightly makes for greater difficulty in milking and more danger of injury to both teats and udder.

The milk veins are usually very prominent on large producing cows. They should be large, crooked, tortuous and branched, entering the chest cavity well forward and through several large openings known as milk wells. The milk veins carry a part of the blood away from the udder and are therefore indicative to a certain extent of the blood flow from the udder. The veining on the inside of the thighs and on the udder is another indication of good blood circulation in this region. On high producing cows the side of the udder is frequently a network of prominent veins.

Poor Types of Udders

The udder lacking in size and texture is the one to be most avoided no matter what the other qualities of the animal may be, for it is impossible to get much production from a small udder lacking in quality.

The pendulous udder. This is the udder that has broken attachments and hangs low, sometimes touching the ground. Udders of this type are causing continuous trouble from the cow stepping on the teats, cuts and bruises from objects in the pasture

and lots, and then difficulty of milking because of being too close to the ground.

Funnel Shaped Udder. This type gets its name from the fact that it tapers to a point like a funnel. Such udders always lack in development, as well as being undesirable from the standpoint of looks.

Quartered Udders. The quartered udder is the one in which the four quarters seem to be distinct. In extreme cases there is difficulty of determining the point of junction between teats and udder so gradual does each quarter of the udder spread out from the teats.

Unevenly Developed Udder. Is the udder in which the one part is less developed than the other. It is rather common to see cows with the rear quarters more developed than the front quarters.

Blind or Lost Quarters. Often the secreting gland of a quarter is destroyed through infection or injury and sometimes the gland fails to develop. A cow with one quarter gone is really but three-fourths of a cow.

Style and General Appearance

Style and general appearance relates to symmetry of form, beauty to the eye and breed characteristics. It cannot be classed as one of the essentials to production for many great producers have lacked in this respect, yet it can be combined with great production as

many of the greatest producing cows have also been show winners. Other things being equal, the cow with the best style and general appearance is the one in greatest demand and will command the highest price when sold. The following should be observed in judging for style:

Balance of different parts and smooth blending of the parts.

Head erect and alert.

Good carriage in walking.

Clean cut throughout and free from coarseness and blemishes.

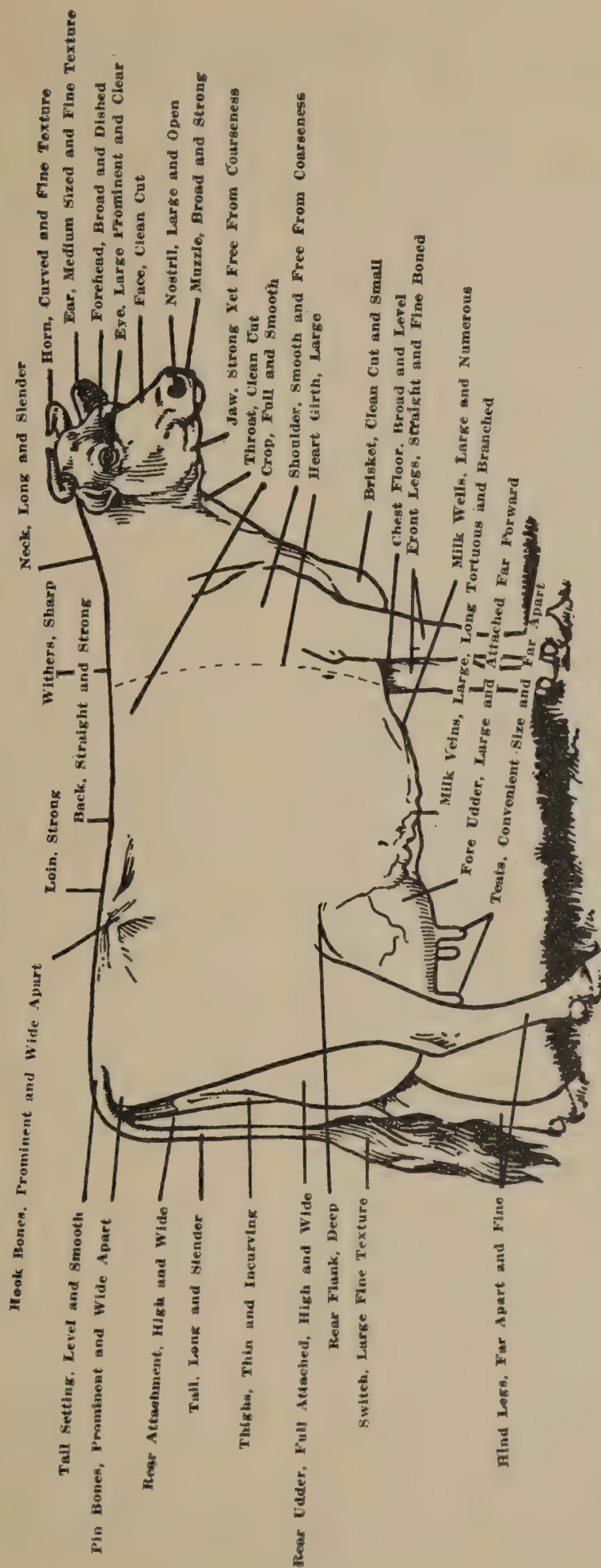
Straight back and neck, level, long and wide rump with level tailsetting.

Well balanced udder hung high and wide behind and attached far forward.

Straight legs with fine bone of good quality.

Good size for the breed.

While a good judge of dairy cattle can distinguish the poor producers by their appearance, no one can tell the exact production of the dairy cow from her appearance. This must be determined by weighing and testing of the milk. Knowing the good points of the dairy cow and persistently using such knowledge will enable one to build up a herd that is not only good at producing, but that is also pleasing to the eye. Neither judging or record keeping should be substituted one for the other, but both should be used together for the best results.



Location of the Different Parts of the Dairy Cow

THE PUREBRED SIRE

L. V. WILSON, UNIVERSITY FARM

Considerable time and thought have been given of late, especially since the war, to the importance and value of dairying. Minnesota has long been recognized as one of the leading states of the Union from the standpoint of the total value of its dairy products. However strong Minnesota may be in this respect she is only in the embryo stage as a producer. In the marketing of her product she has taken great strides and is taking a leading position as a butter producer as a result of the consolidation of over two-thirds of the six hundred cooperative creameries into a marketing organization, which is building on a quality basis.

However much credit is due dairymen and individuals responsible for the rapid advancement of Minnesota in a marketing sense, she is still woefully weak from the standpoint of production per cow, considered on an economy basis.

What better system of marketing can be devised than to market our farm grown feeds through **good livestock**? No **poorer** market can be found for these feeds than **scrub animals**. When it is estimated that over 60 per cent of our farm grown grains are marketed through livestock in some form or other, isn't it reasonable to feel that the best individuality possible can be none too good?

Minnesota's average cow produces about 160 lbs. of butterfat yearly. We have many producing in the neighborhood of 800 to 1,000 lbs. Why this difference?

To be sure many of these low producers would do 100 per cent better were they given more grain and alfalfa or clover hay and corn silage instead of a limited amount of grain in an unpalatable form, and being subjected almost

exclusively to timothy or wild hay. But, on the other hand a cow in order to be a profitable producer of dairy products must have been bred for dairy production. By this we mean containing in her physical make-up characteristics which are dominant for the production of milk. If she has a tendency to dry up after a four or five months' milking period, then begins to lay on flesh over the back and loin she has characteristics that pertain to a beef producer.

Too often we find that our herds are made up of individuals that have in too small a degree the characteristics of either milk or beef production.

Economy demands efficiency and a beefy cow will not produce dairy products economically, neither will a good dairy cow dress out even a fair carcass nor will she produce calves consistently that will accomplish this result.

What is the cause of the overwhelming existence of these inefficient animals? The answer is the use of a scrub sire or a tendency on the part of many to attempt to fool nature and its laws by changing back and forth from a dairy sire to one of beef type and vice versa.

The latter practice coupled with poor feeding has given us our scrub sires and consequently low average dairy production and low average quality at South St. Paul in both beef cattle and sheep. What is the solution? The answer is, use a purebred sire. Why? As a nation there is none that can with more pride point to its rapid advancement in mechanical devices, etc., in the interests of agriculture. Why have so many of us ignored the inventors, if they may be termed as such, who gave us farm animals bred for certain characteristics, which are so essential for economical production of milk, beef, mutton and

pork? We have the chance now to take advantage of the efforts of such men as Robert Bakewell, Amos Cruickshank, Wm. McCombie and our own great cattle and horse breeder, the late Mr. F. L. Ames. Bakewell, an Englishman, gave us our present day heavy draft horse, which was necessitated as a result of the then existing smaller type of horse not having sufficient weight and draft to perform the duties demanded of a horse in a single hitch at the wharves of Liverpool, and on the farms and the highway. Thomas Bates, Amos Cruickshank and the Colling Brothers, and the late Wm. Duthies have given us Shorthorn cattle that have been improved and bred along lines creating tendencies for more economical production.

Sheep have been bred for centuries purely for certain wool and mutton characteristics. The Guernsey and Jersey breeds of dairy cattle have been intensified for their respective characters by not allowing out crossing of any description for many years. We have our splendid fine wool sheep from Spain as a result of that country making it a criminal offense punishable by death to export a fine wool sheep, for many years. Prior to the war the Belgian government exercised restrictions on the exportation of Belgian horses and certain of the leading individuals were not allowed to leave the country.

These methods of improvement have resulted in what we call purebreds and any scrub sire owner has a chance right now to obtain the benefit of the work of the above mentioned early improvers.

I have said that a purebred sire is dominant for the characteristics of his breed. He has no chance to revert back through his descendants to another type because of his ancestry being bred pure for so long. The scrub on the other hand may have close up in his pedigree a conglomeration of all breeds and types.

With this kind of sire we are only gambling with a predestined chance to lose. A scrub sire's offspring are of all sizes, shapes and often of many colors, while a good purebred used on common females will show his effect in the uniformity of practically all his get. He casts a dye just as when we dip a piece of old white cloth in a colored liquid. Using a scrub sire is just like mixing salt and sugar together in the sugar bowl and then hoping your guest can pick out what he wants.

At Iowa State Agricultural College in 1907 Mr. Hugh G. Van Pelt then in charge of Dairy Husbandry at that Institution went into the Ozark mountains of Arkansas and purchased a number of very inferior individuals, cows commonly called scrubs. These cows were undersized, very inferior in the development of the udder and lacking in constitution and capacity for handling feed. These scrubs were shipped to Iowa and mated to purebred sires of the Holstein, Guernsey, and Jersey breeds. Records were kept on the scrubs and on their daughters by the purebred sires. The scrub cows averaged 186 pounds of butterfat and their first cross daughters 259 pounds. These daughters were again mated to purebred sires and the result was a 101 per cent increase in production over their original scrub grand dams. The experiment has been continued and a steady increase in production has been maintained and many of the grades are averaging around 500 pounds of butterfat yearly on twice a day milking.

Not so many years ago our Western prairies were flooded with inferior type beef animals commonly called long horns. Today it is far more common to see large herds, hundreds in number, all white faces or of good Shorthorn characteristics instead. This has been accomplished by the use of purebred Hereford and Shorthorn bulls. Scrubby in-

ferior type in our Western flocks of sheep is fast being replaced by high grade Rambouillet, Hampshire and other breeds adapted to range conditions, by the use of good purebred rams of these respective breeds.

When Victor Stiehl of Albert Lea started to grade up his dairy herd several years ago he purchased a purebred Guernsey bull "Prince of Oaklawn 2nd." In the herd was a cow named "Molly." The local cow testing association showed Molly only capable of producing 149 pounds of butterfat in one year. When her daughter, "Molly 2nd," came along sired by "Prince of Oaklawn 2nd," she produced 495 pounds of butterfat as an average for five consecutive years. What factor was responsible? The dairy tendency predominant in her purebred sire.

Mention has been made as to the comparative efficiency of our average cow as consumer of feed and a producer of dairy products to the way her product is being marketed. The same is true of our market or fat animals. Through

improved methods of marketing livestock at the South St. Paul market many thousands of dollars have been saved Minnesota farmers, but the proportionate amount saved on each individual steer, lamb, or pig is certainly small when one realizes how much more each of these individuals might have brought on the market had he been sired by a purebred sire, grown out and finished on economical home grown feeds.

It has been deemed advisable by many successful men to buy on a low market. According to this philosophy now is the time to secure your purebred sire. Do not be afraid of a tried sire. You are only playing the game much safer if you can buy a sire after seeing that he has sired good offspring.

The latter is the measure of a sire's worth. Your county agricultural agent will be glad to help you find one; otherwise write or visit direct breeders of the breed you prefer or the state secretary of the breed in which you are interested.

*Scrub Cow Doesn't
Pay For Her Keep*

She Costs—	Dr.
6,000 lbs. silage, 3 tons at \$6.....	\$ 18.00
3,750 lbs. mixed hay, 1¾ tons at \$15.....	26.25
1,500 lbs. mixed grain, ¾ ton at \$50.....	37.50
2,400 lbs. green feed, 1 1-5 tons at \$6.....	7.20
Labor, 170 hours, at 30c.....	51.00
Bull service	10.00
Milk haul, 40 cwt., at 12c.....	4.80
Total cost	\$154.75
She Produces—	Cr.
4,000 lbs. milk at \$2.25 per cwt.	\$ 90.00
1 calf	5.00
10 tons manure at \$1, stable value.....	10.00
Total credit	\$105.00
Loss to owner	\$ 49.75

DAIRY IMPROVEMENT THROUGH COW TESTING ASSOCIATIONS

BY E. A. HANSON

Division of Agricultural Extension

ADVANTAGES OF TESTING

1. Testing Tells Which Cows Are Profitable

There are many herds in which a few of the cows are highly profitable. Frequently the profits from these cows are turned into a loss from the herd as a whole because the rest of the cows in the herd consume as much feed and labor per cow but give little in return for it.

2. Herd Will Get Better Care

Invariably when a man begins testing, his cows get a little more attention, and especially are they better fed. Many men have been surprised to find through cow testing associations how good their cows really were.

3. Good Cows Worth More When Their Production Is Known

A herd of good grade dairy cows with

records in the Wadena County cow testing association sold at public auction in the fall of 1922 at an average of \$25 more per head than cows of similar breeding without records.

4. Young Stock Worth More

The man who knows and thinks will gladly pay a few more dollars for calves from cows of known production. Wise dairymen do not make a guessing contest of the future herd.

5. Testing Hastens Herd Improvement

Heifers can be raised from the highest producing cows. The value of a young bull or heifer must be judged by the records of its ancestors. Without records of production and cost of feed, improvement is retarded. Heifers



Fig. 1. A Cow Tester at Work

He weighs and tests the milk for production, and finds the cost of feed per cow. The testing way is the highway to success in dairying.

from the cows with the best production records should be raised and retained in the herd.

IMPROVEMENT THROUGH COW TESTING ASSOCIATIONS

The farmers of Minnesota are at present milking more than 1,500,000 cows, a large number of which are unprofitable and actually kept at a loss. The average butterfat production per cow in Minnesota according to reliable estimates does not exceed 160 pounds annually, yet many cows are producing from 300 to 1000 pounds of fat, as shown by official records and cow testing association reports. Hence it is easily seen that a great many cows are producing less than 160 pounds of fat per year. It is on this group of unprofitable producers that the cow testing association centers its attack.

No one can determine accurately the milk and butterfat production of a cow without weighing and testing the milk at regular intervals. Some dairymen attempt to keep their own records, but on the whole the most satisfactory and in the end the least expensive way of having the work done, is by joining a cow testing association. Thus a record of each individual cow's production, cost of feed, and returns over cost of feed, is obtained at the end of the year without the many troubles and partly completed records so common when the dairyman attempts to keep his own records.

Progress Slow Without Records

According to Professor T. L. Haecker (Agricultural Experiment Station Bulletin 130) the average cow in Minnesota in 1890 produced 128 pounds of butterfat annually. The most accurate data available indicate that in 1920 the average Minnesota cow produced on an average 160 pounds of butterfat annually,

showing an increase of 32 pounds of fat per cow equal to an average annual increase of 1.06 pounds, or a gain of 25 per cent in thirty years. Comment on these astounding facts is unnecessary. The need for organized effort to improve the production of the average cow is obvious.

Development of Cow Testing Associations in Minnesota

Co-operative cow testing in Minnesota is of comparatively recent origin. The first association was organized at Albert Lea, December 1, 1910, through the efforts of Professor Theo. Sexauer, agricultural instructor in the Albert Lea Schools, with several local dairymen and with the assistance of F. H. Scribner of the United States Department of Agriculture. Within a year four more associations were organized in the same county, giving that section of the state the distinction of having the first five associations in the state.

Interest in cow testing spread rapidly throughout the state, following the report of results found in the Pioneer association. Not only did the records help in finding the unprofitable cows, but the way was cleared for better care and feeding through information concerning each cow's production gained by a study of the records from month to month.

Dairy improvement begins with the introduction of purebred sires, weeding out of unprofitable cows, and better feeding. It is among the ranks of the common cow that improvement is most needed.

The cow testing association is instrumental in improving low producing herds. A few low producing cows in any herd may make the herd a losing proposition. Weed out the boarders, and feed the remaining cows the way they should be fed and a low producing herd is soon on a paying basis.

Table 1. Growth of Associations in Minnesota

Number in Operation July 1 of Each Year	
1911	3
1912	7
1913	10
1914	9
1915	11
1916	22
1917	26
1918	23
1919	21
1920	19
1921	20
1922	37
1923	55

The main reasons for this rapid growth may be summed up as follows:

- 1. Dairying has been and continues to be an enterprise that yields safe, sure, and gratifying returns at regular intervals.
- 2. Keeping records removes the guess and puts dairying on a business basis.
- 3. It finds the unprofitable cow, encourages better feeding, and increases the selling value of surplus stock from cows having creditable records.

If all the cows in the United States were divided into two groups, the good cows in one and the poor ones in another, the goods cows, if properly fed and cared for, would produce as much milk as all the cows are producing at the present time.

The problem of improvement in dairying is one that needs the closest attention of those engaged in the dairy business. The purebred sire campaigns so successfully launched in Minnesota will improve the herds in the years to come. One of the problems immediately before us is that of feed, care, and management that will result in the highest production possible with the cows now in production.

Feeding and breeding go together. One without the other leads to discouragement. Both combined and practiced judiciously stand as a monument to the efforts of those who have been successful in handling dairy stock.

IT TAKES TWO AVERAGE COWS TO EQUAL THE PRODUCTION OF ONE COW IN TESTING ASSOCIATION

	Average cow in Minnesota	C. T. A. cow 4936 records	Per cent increase
Yearly production of milk, lbs.	3750	6725.0	79.3
Yearly production of butterfat, lbs.	160	262.6	64.1
Value of butterfat at 40 cents per lb. ..	\$64	\$105.40	64.6
Estimated yearly feed cost	\$34.51	\$44.87	30.0
Return over feed cost	\$29.49	\$60.53	105.2

EVERY FARMER WHOSE MAJOR INCOME IS DERIVED FROM THE SALE OF DAIRY PRODUCTS NEEDS A COW TESTING ASSOCIATION

- 1. In order to discover the unprofitable cow. Several such animals in a herd eat up the profits made on the good cow.
 - 2. Because just as much time and effort is required to feed and milk a poor cow as a good one.
 - 3. To encourage systematic feeding methods.
- Unlimited numbers of cows are capable of nearly doubling their production when supplied with the proper kinds of feed and fed according to the production of the individual cow.

Cow-Testing Makes Big Gain for Ten Farmers

TEN Dover dairymen in 1917 had ten herds. The average cow in these ten herds was giving—

in pounds of milk.....	4824
in butterfat	191.8

The same ten Dover dairymen had ten herds in 1922, and the average cow in these 1922 herds was giving—

in pounds of milk.....	6791
in butterfat	259.8

Cow-testing did it.

Some Notable Results Obtained from Testing

Nine herds tested continuously since 1911 in the Pioneer Cow Testing Association, Freeborn County, Minn., show an increase in 1920 of 40.3 per cent in both milk and butterfat production.

	1911	1912
Number of herds	9	9
Average milk per cow, lbs. .	5962	8350
Per cent gain in milk production .....	....	40.3
Average fat test	4.08	4.08
Average fat per cow, lbs. .	243.8	341.4
Per cent gain in butterfat production .....	....	40.3

Another example from the Pioneer Cow Testing Association illustrates the

striking results which follow systematic record keeping.

	1910-11	1920
Number of cows	455	835
Average milk per cow, lbs.	4731	7252
Average fat test	4.0	4.0
Average fat per cow, lbs. .	189	290
Per cent gain in butterfat production .....	....	53.5

Testing Put Dover Dairymen to the Front*

	1917	1922
Number of herds	10	10
Average milk per cow, lbs. .	4824	6791
Per cent gain in milk ..	....	40.6
Average fat test	3.99	3.82
Average fat per cow, lbs. .	191.8	259.9
Per cent gain in butterfat	....	35.5



Fig. 2. Queen produced 365.3 pounds of fat worth \$171.69 at a feed cost of \$49.50, leaving a gain of \$122.19.

*The ten herds taken for the 1922 average were owned by the same men in 1917.

What Proper Feeding Did in the Blue Earth Cow Testing Associations

	1920	1921
Average milk per cow, lbs.	7120	8500
Per cent gain in milk ..	....	19.5
Per cent fat test	4.00	4.05
Average fat per cow, lbs.	285	345
Per cent gain in butterfat production .....	....	21

In making his annual report the tester in charge of the association said, "I

attribute the gain of 60 pounds of butterfat per cow to the better care and feeding of the last year. The majority of the cows were fed on a grain ration the year round, thus keeping up the production during the summer months."

The records of a few herds selected from hundreds in Minnesota where increased production has been secured through the influence of a cow testing association are shown in Table II.

TABLE II

	Year	No. cows	Av. lbs. milk per cow	Percentage of fat test	Av. lbs. fat per cow	Percentage gain in fat production
Herd A	1911	13	5,530	4.0	226	....
Pioneer CTA	1920	15	7,732	4.6	359	58.8
Herd C	1911	19	6,258	4.4	275	....
Pioneer CTA	1920	16	7,721	4.9	378	37.4
Herd I	1921	23	5,057	4.6	237	....
Plainview Elgin CTA	1922	24	5,770	4.7	270	13.9
Herd M	1921	17	9,072	3.5	318	....
No. Hennepin	1922	17	10,751	3.4	366	15.1



Fig. 3. Mary produced 84 pounds of fat worth \$41.95 at a feed cost of \$49.40. Loss \$7.55 on feed alone.

The two cows, Queen and Mary, were in the same herd. A yearly record and feed cost showed that it took nearly one-half of the profit from the good cow to keep the poor one in the herd.

The performance of grade cows in the testing association demonstrates the value of purebred sires in dairy improvement.

Too many good sires go to the shambles before their value is known. When George Christison, of Plainview, Minn., joined the testing association he found the daughters of his former herd sire "Lodster" exceeding the production of their dams by more than 100 pounds of butterfat.

During the autumn of 1922, when Mr. Christison desired to dispose of a part of his herd, buyers were eager to pay a

premium for his cows because they had demonstrated their ability to produce.

Pasture Plus Grain Increases Profits

High producing cows are unable to consume a sufficient amount of grass to meet the requirements for maintenance and production. The sudden drop in the flow of milk so commonly noticed in midsummer is not due altogether, as believed by many, to flies and extreme heat, but rather to a lack of feed, in other words, plain starvation. It is doubtful if cows well along in their lactation period or naturally low producers will increase sufficiently to warrant much grain in addition to pasture. Special reference as regards grain feeding while on grass is made to high producing cows and to those coming fresh in spring and early summer.

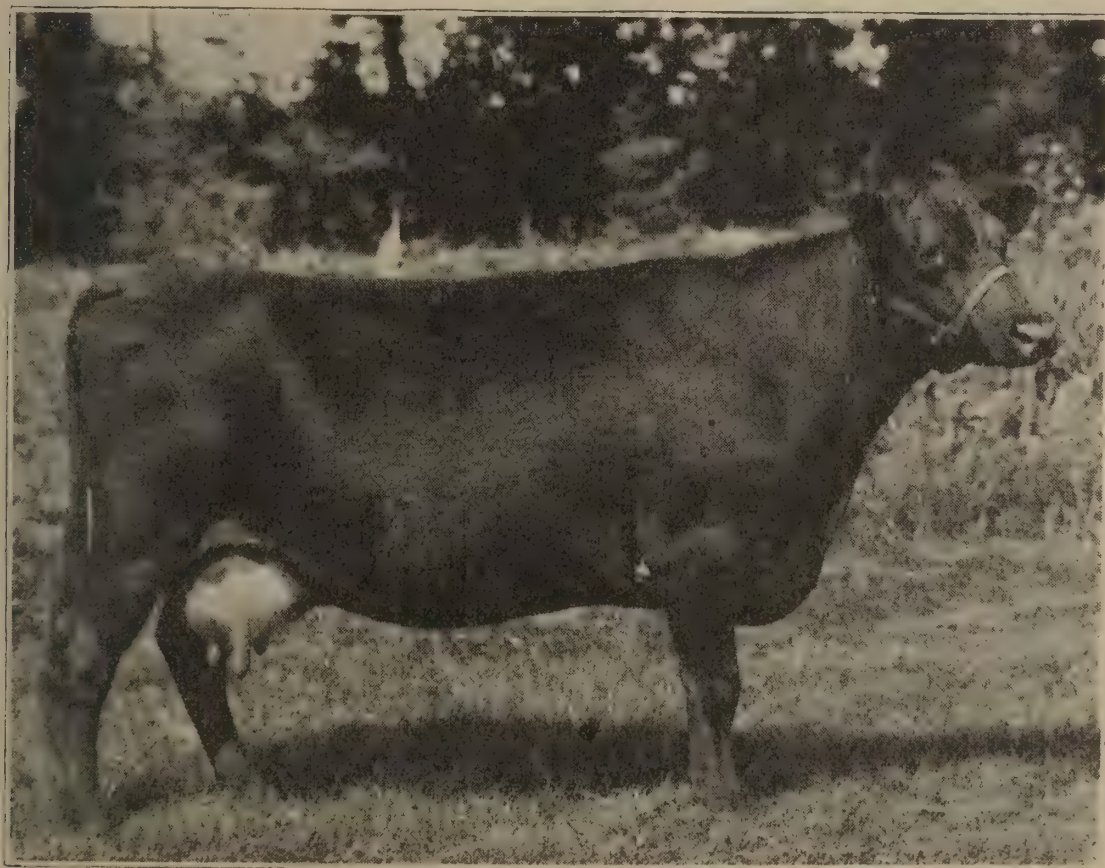


Fig. 4. Molly 2nd, a grade Guernsey owned by Victor Stiehl of Albert Lea, Minn., has an eight-year cumulative record of 3779 pounds of butterfat. The first record of 288 pounds of fat was made in 1911. In the following years she produced, 372, 434, 460, 495, 613, 509, and 608 pounds of butterfat, or an average of 472 pounds for each of the eight years.



Fig. 5. The dam of Molly 2nd was a common cow of no particular breeding, with two yearly records of 104 and 168 pounds of butterfat, respectively.



Fig. 6. Three grade cows sired by "Lodster," a purebred Jersey. Average yearly butterfat produced 427 pounds. The yearly average of their dams was 238 pounds of butterfat.

Relation Between Yearly Butterfat Production, Cost of Feed and Returns Over Cost of Feed

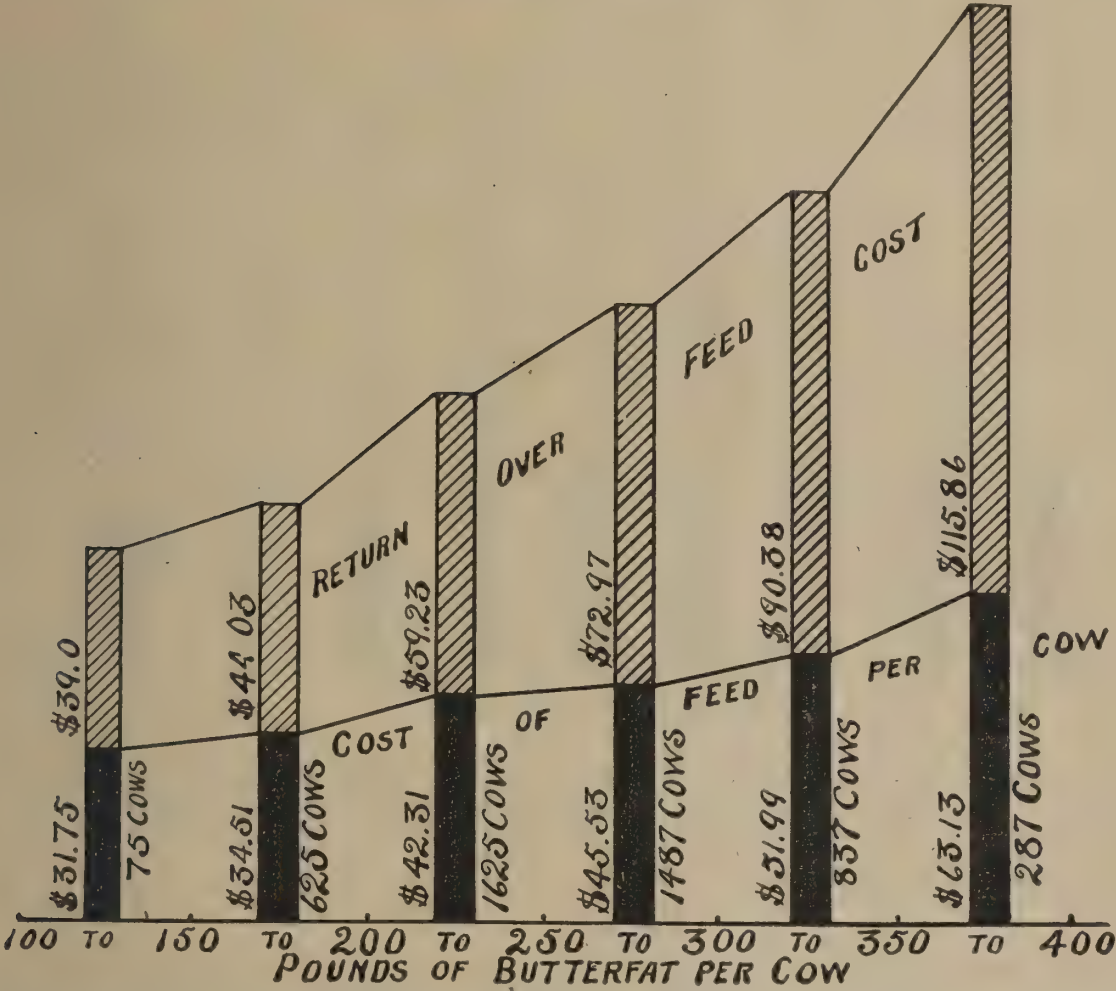


Fig. 7. High producing cows show greater earning power than low producers. A tabulation of 4993 yearly records shows that as butterfat production increased from 100 to 400 pounds there was a regular increase of about \$15 in income and \$6 in cost of feed per cow for every 50 pounds of increase in average production of butterfat.

When cows return \$1 or more above for the dairy cow on the farm is then each dollar's worth of feed consumed, one of the best market mediums. the problem of marketing crops is solved,

TABLE III
Comparison of Production of Cows Fed Grain in Addition to Pasture and Those Given Pasture Only*

Pasture and grain Group 1			Pasture only Group 2		
No. cows	Av. feed cost	Av. lbs. fat	No. cows	Av. feed cost	Av. lbs. fat
572	\$49.35	296.4	1231	\$41.87	228.4

Did It Pay?		Difference in butterfat production, pounds		68
Feed cost, Group 1	49.35	Value of butterfat at 40 cents per pound		\$27.20
Feed cost, Group 2	41.87	Subtracting increased feed cost		7.48
Added grain increased feed cost	\$7.48	Gain per cow		\$19.72

*From yearly cow testing association summaries.

Relation Between Yearly Butterfat Production Per Cow and Returns Above Each Dollar Expended for Feed

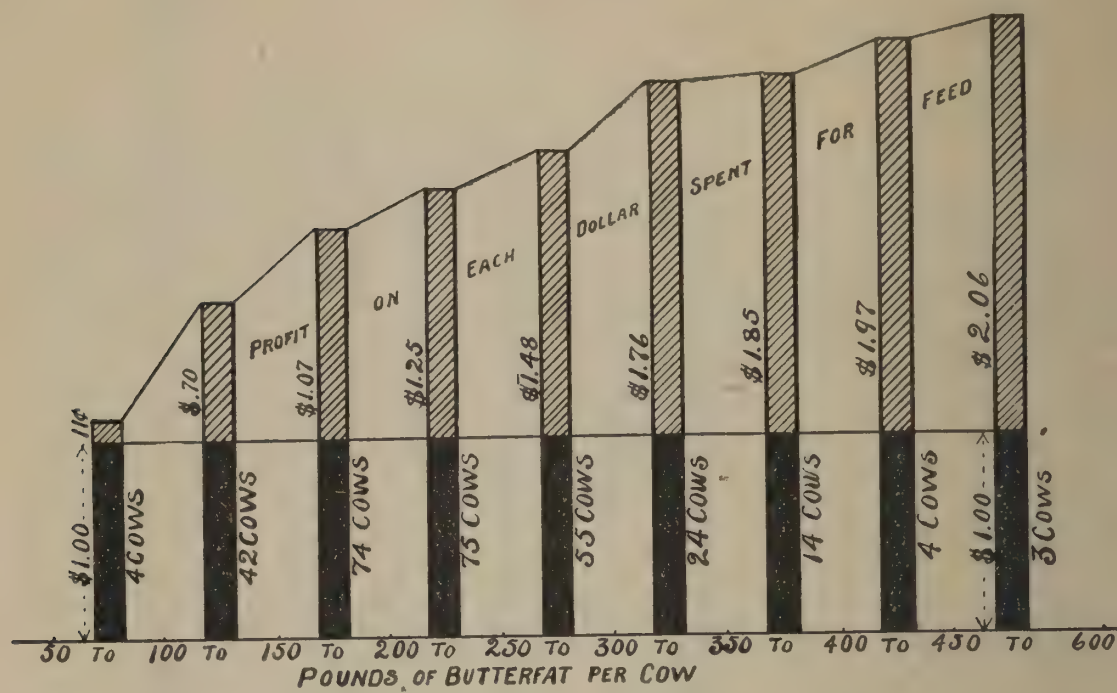


Fig. 8. Range of returns above each dollar expended for feed from 295 cows tested in the Meeker County cow testing association in 1922. As production of butterfat increased from 50 to 582 pounds per cow, the returns above each dollar expended for feed increased from 11 cents to \$2.06.

Suggested Rations Increase Production

The cow testing association helps its members to practice right methods of feeding. Production may be consider-

ably increased without a proportionate increase in cost in many herds by providing the proper feeds in sufficient quantities to meet the cow's requirements for maximum production.

TABLE IV

	Lake Pepin CTA, Wabasha Co. 20 cows		Pine County CTA. 11 cows	
	Before using balanced ration	After using balanced ration	Before using balanced ration	After using balanced ration
	Nov. 1921	Dec. 1921	Nov. 1921	Dec. 1921
Total milk, lbs.	11,920	14,060	6126.3	8459.0
Increase in milk, lbs. ....	.....	2,140	.....	2332.7
Increase in butterfat, lbs. ....	.....	83.3	.....	85.9
Value of increase ..	.....	\$38.39	.....	\$38.65
Cost of feed for herd	\$29.52	\$42.17	\$15.40	\$27.48
Net gain above feed for Dec. over Nov...	.....	\$25.74	.....	\$25.57

Silage, Legumes, and Grain Assist in Maximun Economical Production

Silage

The cow that must eat dry, unpalatable corn fodder or stover does not fill the pail. Silage, like pasture grass, stimulates milk production, increases vigor, and aids digestion.

Legumes

Without legume hay the most satisfactory results are well-nigh impossible. Two very essential constituents for milk production, **protein** and **lime**, are found abundant in clovers and alfalfa.

In the Meeker County Cow Testing Association, cows that were fed legume hay produced 2086 pounds more milk annually than cows fed common non-leguminous hay, such as ordinary upland and timothy.

Grains

If silage and legume hay are not provided, economical winter production of milk and butterfat can not be hoped for. Farm-grown grain crops such as

corn, barley, and oats meet the requirements quite satisfactorily for herds averaging not more than 250 pounds of fat annually when silage and legume hay are provided. Bran is recommended in the ration for its stimulating and laxative properties. In the absence of legumes, if high production is to be maintained, considerable quantities of linseed meal and cottonseed meal must be provided. This will materially increase the cost of producing a pound of butterfat. By changing from a poor ration not fed according to production, to one providing more **protein** and fed at the rate of one pound of grain to each 3 or 4 pounds of milk produced, a member of the Pine County Cow Testing Association increased the production of his herd of 11 cows 2332 pounds of milk in one month. (See Table IV.) A comparison of cow testing association records shows that production is increased when some grain is fed during the summer, especially when the pastures get short and do



Fig. 9. "Bones," a grade cow found in the Blue Earth County Cow Testing Association. Yearly record, 22,367 pounds of milk, 760 pounds of butterfat. The highest producing cow in Minnesota cow testing associations.

not provide enough feed to maintain production. Testing associations show an annual average increase of 68 pounds of butterfat per cow in favor of feeding grain in summer. (See Table III.)

HIGH PRODUCING GRADE COWS ARE IN DEMAND; FIND THEM THROUGH THE COW TESTING ASSOCIATION

To be profitable, grade cows must be able to produce large quantities of milk and butterfat, as grade sires have no value, and grade females from the stand-

may be entirely changed through a few generations of grades from sires bred for production. Frequently the opinion is held that a common herd does not warrant the investment in a good purebred sire. It is in herds of this sort that good blood tells the quickest. Increase in butterfat production comes with comparative ease and rapidity up to 300 pounds annually. After that point is reached each succeeding generation will have a smaller increase over the previous one, as compared to the first and second generation grades.

	No. cows	Average lbs. milk	Percentage test	Average lbs. fat	Feed cost	Gain above cost
Herd A	12	8,601	3.88	335.2	\$49.35	\$89.89
Herd B	12	5,441	3.68	200.3	49.92	35.00

point of financial returns do not begin to compare with purebreds.

Profitable dairying for the average farmer is essentially a question of having grade cows of a high standard of production, for every one is not especially adapted to be a breeder of purebred cattle.

Breeding, as Well as Feeding Counts

Two herds in the Progressive C. T. A., New Richland, Minn., illustrate the effect of good breeding. Twelve cows in herd A were equal to 24 cows in herd B.

Herd A is composed of 12 high-grade Holsteins, the result of using a well-bred sire.

Herd B is composed of 12 scrub and common cows, showing no particular breeding, but a predominance of dairy conformation.

The fact that the feed cost per cow for herd B is greater than for herd A makes these comparisons the more important from the standpoint of placing a definite value on the improvement noted where better breeding is found.

Inherited low production established through generations of scrub ancestry

The present demand and prices received for high-grade dairy cows are an index to their importance from the standpoint of production in the dairy industry.

A good cow soon pays for herself. A poor cow brings her owner another mortgage. There is a pride and satisfaction associated with the ownership of good stock that can not easily be attained through any other enterprise on the farm.

ORGANIZING THE TESTING ASSOCIATION

The most common way of organizing a cow testing association is to make a preliminary survey in the community of the interest in dairying, the number of cows kept, and the general sentiment toward cow testing association work.

The next step is to call a meeting of those interested at the most convenient point. Such meetings are usually called at the request of the county agent or by a group of dairymen interested in testing. The Agricultural Extension Division of the University of Minnesota is always willing to assist with

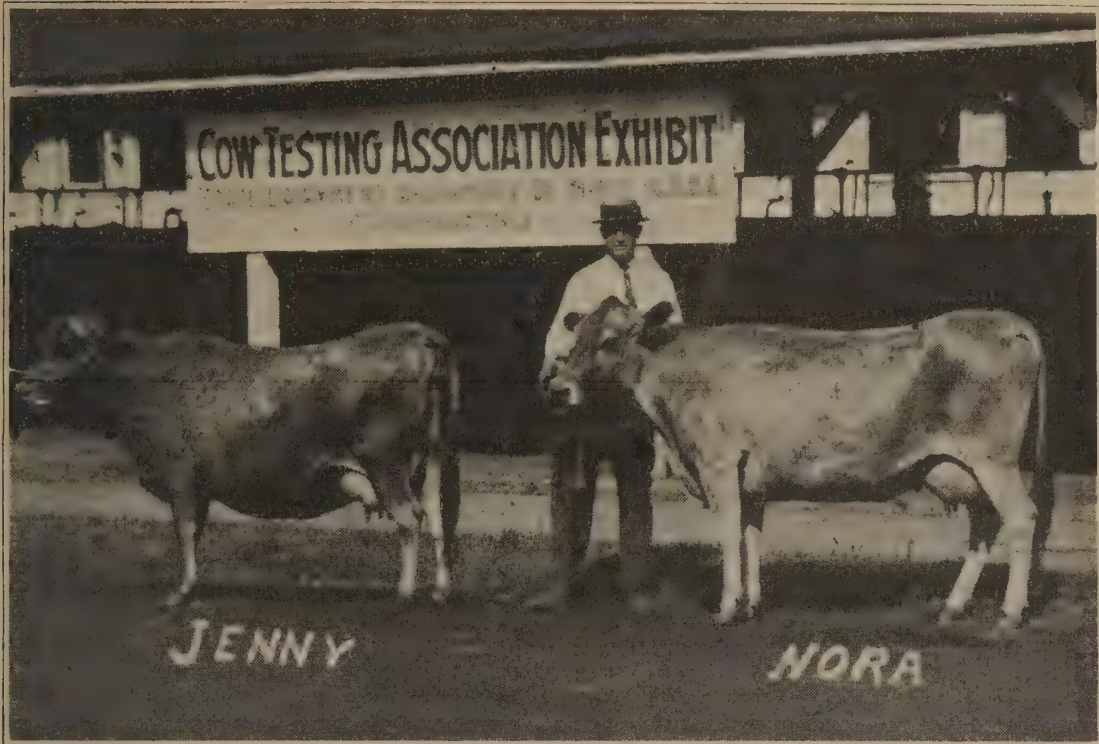


Fig. 10. Jenny produced 454 pounds of fat in a year, leaving \$139.70 gain over feed cost. Nora produced only 140 pounds of fat, that left but \$14.67 above feed cost. She is not a bad sort of cow to look at, but she lacks the inherent ability as well as the capacity to handle large quantities of feed for milk production.

Slacker Cows Eat Up Profits of Good Cows

A cow-testing association will help you to get rid of the slackers and keep only the profit-makers.

Get into a cow-testing association now!

such work. In the majority of cases a few days of individual soliciting among prospective members is necessary to secure the 26 required members. As a final step in the organization a meeting is called for those who have signed the year's contract to test. The purpose of this meeting is to elect officers and two directors. The officers are a president, vice-president, secretary, and treasurer. The officers and directors constitute the governing board of the association.

The business transacted at the first meeting is in general as follows:

1. Election of officers.
2. Fixing the date for the work to begin.
3. Discussion of method of securing dues from members.
4. Authorizing the purchase of a testing outfit.
5. Fixing wages to be paid tester.
6. Considering applications for tester.

Agreements and Forms

The plan of organization proving the most satisfactory in Minnesota is the "day plan," in which each member pays a fixed fee for each day of the tester's services, regardless of the number of cows, up to thirty. The advantage of the day plan is that each member will enter all his cows in the test, thereby getting the greatest benefit from the association.

The ideal association is composed of 26 herds, as this number keeps the tester busy all the working days in a month.

In order to make the collection of dues as easy and simple as possible, they are made payable to the treasurer of the testing association by means of pre-dated checks. These are made out for the quarterly dues of each member, the first check dated for the time the work starts, the three remaining checks are dated the fourth, seventh, and tenth months after the date of the first check. The checks used for this purpose are

furnished to those who plan to organize cow testing associations.

Cost of Testing

The salaries paid to testers vary considerably, but at present the wages in Minnesota range from \$50 to \$80 per month. His experience and qualifications determine largely the salary paid. The cow tester obtains free board and room from the members.

The expense to each member is reduced to the lowest possible rate that will furnish sufficient funds to hire a competent tester and purchase the necessary equipment.

The monthly basis of organization charging a fixed fee per herd has proved the most satisfactory. All but three associations in Minnesota are now operating with entire satisfaction on this basis.

With the present wages of testers and cost of equipment a fee of \$3 to \$4 per month is charged to each member, where at least 26 members can be secured. Membership blanks may be secured from the Agricultural Extension Division, University Farm, St. Paul, Minn.

Qualifications of a Tester

The success of an association rests almost entirely upon the shoulders of the tester in charge. He should have some special training and possess a personality that will allow him to adapt himself readily to varying environments. The most important requirements are punctuality, regularity, and accuracy. Unless he has these qualifications his records may not be a true indication of the cow's production.

The tester should have sufficient training and practical experience in feeding dairy cows that he may advise members intelligently on feeding for maximum economical production through balanced rations and the proper selection of feeding stuffs.

In order not to leave the impression that the tester is the only factor in the success of the association, it is well to mention the part the member plays, as well. Testers are looked upon by many as individuals who never should make mistakes. Remember mistakes are human shortcomings. Too frequent errors can not be tolerated, but, on the other hand, sympathetic co-operation of members with the tester in correcting errors

will go a long way in making a successful association.

Members who never study their herd books or make changes in feeding methods as suggested by the tester are nearly always the ones who are the least enthusiastic about testing and usually their conclusions are that testing and keeping records has not been of any special value to them, and that they have learned nothing that they did not already know.

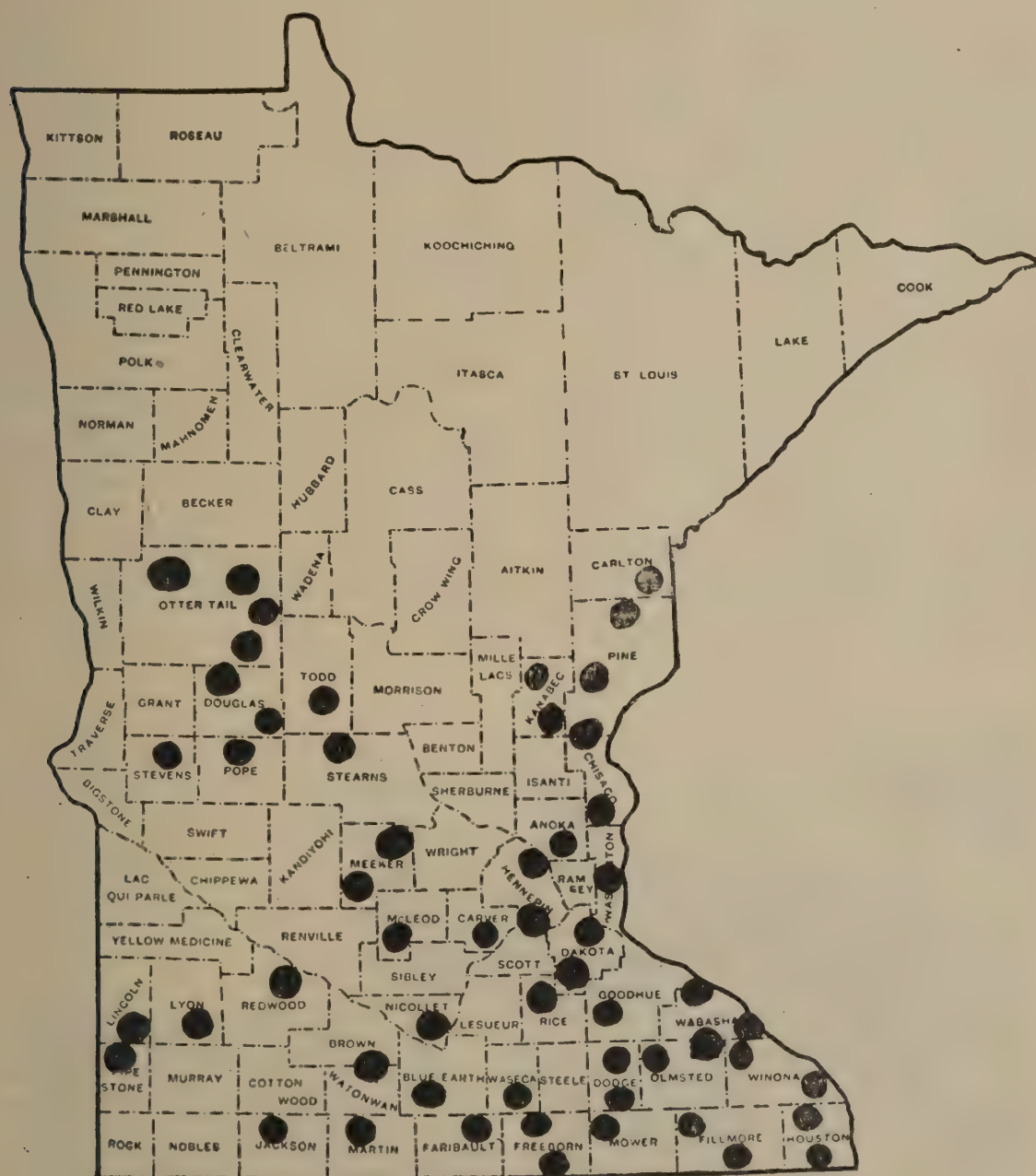


Fig. 11. Testing Associations in Minnesota

Each dot on the map represents the location of a testing association, July 1, 1923. One out of every hundred dairy cows in Minnesota is on test in cow testing associations. With one out of every three cows unprofitable, more testing associations are needed to weed out the boarder cows. The result will be a higher standard of production, and an annual income such as every dairy farmer is entitled to.

BUILDING UP A DAIRY HERD UNDER FARM CONDITIONS

The Record of Herd Improvement at the North Central Experiment Station,
Grand Rapids, Minn.

BY O. I. BERGH, SUPERINTENDENT

This is a story of the value of using purebred sires, of selecting good producing cows from records of their performance in the milk pail, and of an attempt to feed efficiently for production. All the records were made under ordinary farm conditions, the cows being milked twice daily and each cow carrying a calf. For this reason it should be of value to every farmer in northern Minnesota who is interested in improving his dairy herd by better breeding, selection, and feeding.

Production records of the dairy herd at the North Central Experiment Station extend over twenty-one years. A definite breeding program, however, was not begun until 1907 with the use of Highmark, a registered Guernsey bull, as herd sire. Previous to this bulls of various breeds or of no breeding, in-

cluding common, Shorthorn, and Red Polled, were used.

The record shows that forty-four foundation families of common and mixed blood have been included in the station herd in the twenty-one years, all before 1910. Since 1907 only registered bulls and five registered females (one purchased in 1919 and four in 1921) have been introduced into the herd.

There are six families in the herd that have daughters by one or more of common, Shorthorn, and Red Polled bulls, as well as daughters by registered Guernsey bulls. It is interesting to compare the production of the daughters of these cows by the bulls of different breeding.

The following table presents the summary of the average pounds of milk and butterfat produced annually by the various generations starting with the foundation cows.



Garden 2 and Her Daughters
One of the Good Families Developed at Grand Rapids

SUMMARY	Milk, lbs.	Butter- fat lbs.
Average production of foundation cows, common and grade Red Polled	5177	219
Average production of daughters by common bulls	5550	211
Average production of daughters by Scotch Top Shorthorn bulls	4209	176
Average production of daughters by purebred Red Polled bulls	4689	208
Average production of daughters by Guernsey bulls	6091	306

It will be noted that the average production of the cows that started in the herd was 5177 pounds of milk and 219 of butterfat. By using common bulls of nondescript breeding on these foundation cows the average production of their daughters was slightly more of milk but 8 pounds less of butterfat per cow; also the daughters from a Scotch Top Shorthorn bull gave further decrease in the amount of butterfat and a corresponding decrease in the amount of milk. The use of purebred Red Polled sires produced daughters that gave slightly more milk and butterfat than the daughters of

Shorthorn sires, but it was not until the advent of the purebred Guernsey bulls that the production was increased to the more satisfactory average of more than 6000 pounds of milk and 306 of butterfat per cow.

Since 1904 the herd has consisted of from 30 to 60 milk cows, and about an equal number of heifers. The average production in 1904 was 4570 pounds of milk and 196 of butterfat. From that year to 1913 there was little increase in production; the average for 1913 was 5371 pounds of milk and 236 of butterfat. The average for the ten years, 1904 to 1914, was 5159 pounds of milk with 226 pounds of butterfat. This indicates that there was little improvement on account of the sires used previous to 1908.

Since 1914, as the Guernsey grades came into maturity and the common and mixed bloods of non-dairy breed were eliminated, the average yearly production of the herd increased very rapidly as follows:

Yearly production average for 1904, and yearly herd production averages for 1911 to 1922, inclusive, also per cent of butterfat in milk by years:

Year	Average pounds milk per cow	Average pounds butterfat per cow	Average per cent butterfat	Average per herd
1904	4,700	196	4.2	4,700 pounds milk 196 pounds butterfat
1911	5,301	226	4.7	Six-year average, 1911 to 1916, inclusive: 5,584 pounds milk 256 pounds butterfat
1912	5,371	236	4.4	
1913	5,313	227	4.4	
1914	5,519	259	4.7	
1915	5,721	280	4.9	
1916	6,281	301	4.8	
1917	7,184	358	5.0	Six-year average, 1917 to 1922, inclusive: 6,894 pounds milk 334 pounds butterfat
1918	6,502	313	4.8	
1919	7,152	333	4.7	
1920	6,972	341	4.9	
1921	6,757	332	4.9	
1922	6,797	331	4.9	

Increased
Production
of Butterfat

The way to get it is through the use of the

Purebred Dairy Sire

Read the story of the building up of a dairy herd under farm conditions, at Grand Rapids, Minnesota.

The story is told here.

In 1914 it was 5519 pounds of milk and 259 of butterfat; in 1915, 5721 pounds of milk and 280 of butterfat; in 1916, 6281 pounds of milk and 301 of butterfat; and in 1917, 7184 pounds of milk and 358 of butterfat. For the last six years, including 1917, the average yearly production for the herd was 6899 pounds of milk and 335 of butterfat.

Before 1914 no cow in the herd had reached a yearly maximum production of 400 pounds of butterfat. However, during the eight years following 1914, after the Guernsey grades had reached maturity, 21 cows have exceeded a yearly production of 400 pounds of butterfat and three cows have exceeded 500 pounds, the highest being 544 pounds.

These figures indicate a fairly uniform, progressive increase in the average amount of butterfat produced per cow through the period of development with the exception of the year 1918. This decrease in production is accounted for

by the lack of suitable feeds to provide a satisfactory ration, that were available in 1917 and the years following 1918.

When one considers the average production of the herd in 1904 of 196 pounds of butterfat, which, as a matter of fact, is at least 30 pounds more than the present average of all cows in the state; and the average for the next six-year period, 1911 to 1916, inclusive, there is an average gain of 50 pounds of butterfat per cow, due not so much to the influence of sires alone but to selection and the feeding of properly balanced rations.

The next six-year period, 1917 to 1922, inclusive, shows a still further increase of 78 pounds of butterfat per cow in which the use of purebred Guernsey sires undoubtedly played a very important part. There is in these figures a plain, practical lesson that should assist in the more rapid improvement of the average production of the grade cow commonly found on Northern Minnesota farms.

OUR DAIRY HERD AND ITS MANAGEMENT

L. JENSEN, CLEARBROOK, MINN.

If today I should be called upon to tell what branch of the farm work has paid the best, during the 19½ years that we have lived on the farm, I would unhesitatingly say that the dairy cow has not only paid us the best, but she has made it possible to have good buildings on the farm, and to forge ahead each year, even though farm conditions in general have not been of the best.

When we moved onto this farm in Clearwater county, Minnesota, 19 years ago last spring, our farming experience was quite limited, and our capital even more so. We were considerably younger at that time, and put up with conditions that would discourage most people nowadays. Our nearest railroad was 14½ miles away, and the roads were only crooked trails.

The first few years, the farm did not yield enough revenue to support the family and the writer had to supplement the income by employment elsewhere. In this we did not differ from most of the new settlers, only, having had training for office and bank work, the income so derived was probably a little larger.

However, as the farm was gradually developed, it soon required all of our attention. But we still farmed in the good old way—kept some scrub cows, the best that we could obtain around home, and raised a little wheat, about the only cash crop that we had.

About that time, some 16 years ago, the Extension Department of the Agricultural College, under the able leadership of Prof. A. D. Wilson, began to agitate the keeping of better dairy cows

and the building of co-operative creameries. Farmers' Institute work was carried on in the country schoolhouses. The Dairy and Food Department sent out able men, and everything was done to encourage the keeping of better sires.

The writer was properly inoculated with the better cow "bug," thoroughly implanted by Prof. A. J. McGuire, then located at Grand Rapids. Mr. McGuire spent considerable time and gave his best efforts to further the initial growth of the dairy business in Clearwater County.

I can still remember one of his statements, that I felt somewhat skeptical about at the time. He said that with our small fields there was no use in selling any grain on the market; we should feed it all to our dairy stock and hogs.

At that time I could not see how in thunder we would get along if we did not have a little wheat to sell. Where would our cash come from?

This was 16 years ago last fall, and about that time things began to happen. We organized a co-operative creamery and started making butter in the spring of 1907. It has been in successful operation ever since, and is one of the good creameries of Northern Minnesota today.

I bought my first purebred sire at about that time, and, while some of my neighbors thought that I was a little "soft," time has demonstrated that I was on the right track. Next, I bought a milk scale and Babcock tester, and ever since that time we have weighed every milking.

Four years after I bought the purebred sire, I bought my first purebred cow and started the nucleus of the present purebred herd. I went at this thing very gradually, as I had no extra money to spend on the herd, and I wanted the cows to pay their own way; and in the meantime I would be getting the training and experience which would fit me for the work of breeding and developing purebred dairy stock.

We have now 24 registered Guernsey females on the farm, including the young stock, and we generally milk from 10 to 12 head the year around.

Last year our income from the herd was an even \$3,000, half of which was derived from the sale of cream at the local creamery, and half from the sale of surplus stock. This year it will run at about the same figure. Butterfat prices are somewhat lower, but we are getting a little better prices for the surplus stock, of which we never have enough to supply the demand.

We pride ourselves upon having bred up a high-producing herd of vigorous, healthy stock. We test annually for tuberculosis, and have been on the accredited list for years. We have never had a case of abortion.

We are also doing advanced registry work, and are well satisfied with the results. We are mostly testing in the farmers class, with only two milkings a day, and at that we show close to three pounds of butter per day with some of the cows.

With a number of the cows that we kept a close account of last year, we made a net profit of \$105.40 per cow. We gave them no credit for the calves, and charged them only for the pasture, hay, ensilage and grain. We figured that the calves more than paid for the work of caring for them.

Without the cows I should not care to farm in this section of Minnesota. Our soil is rich, and it seems that all kinds of pests like to grow here, including the perennial sow thistle. But with the cow on the job, we can even hold that down. On our farm we grow clover every third year, and that will subdue any weed, including this much-feared sow thistle.

We aim to grow all of our own feed, and this year we threshed 2500 bushels of oats and barley, which will take care of the cows. In addition to this, we

Dairying Distributes Work Through Year

L. Jensen of Clearbrook says that on his farm the work is so evenly distributed that the need of extra help is not great.

“An even \$3,000,” half from the sale of cream and half from the sale of stock was his record for last year. His net profit was \$105.40 for each cow.

“Attention to details” is given as one of the keys to success on the Jensen farm.

have a well filled silo and an abundance of clover and alfalfa hay, and a large supply of mangels.

Our system of farming distributes the work pretty evenly throughout the year, and we are able to handle the work without hiring much extra help. While our income is not large, we do not pay it all out for expenses.

We attribute a large share of such success as we have met, to a close attention to details, and a due respect paid to the "small things." We have never permitted our machinery to rust and decay outdoors, and we still have some of the original machines which we started farming with, 19 years ago.

We also wish to give due credit to the Agricultural and Dairy Publications, which have been a great aid to us, throughout the years. They not only fight our battles for us, but aid us daily in our work, by timely and valuable suggestions.

As to our herd of purebred Guernseys, we always aim to have a herd sire that is superior to any other animal in the herd, even though this may entail a large outlay of cash. Next in order of the breeding-up process, comes good feeding, liberal feeding, and this we

practice with good results. As we raise practically all of our own feed, we do not have to use our cream checks to purchase feed.

Summing it all up, I have never regretted that we moved from town and on to the farm. Of course, we have been fortunate in many ways. We no longer live 14½ miles from the railroad, and we did not have to move either. The railroad came to us, and brought along with it a nice little town of about 500 people.

I am satisfied with what we have accomplished in good old Minnesota, and to live in a community where the people co-operate and a good neighborly spirit prevails. Were I younger, I would neither fear nor hesitate to do it all over again.

And next to a good, life helpmate, such as some of us have been blessed with, I should place my reliance in man's foster mother, the Dairy Cow, to help me toward the goal of all worthy farmers—financial independence, opportunity to achieve in my chosen line of work, and, when the evening shades of life approach, the knowledge of having helped to make this world a better place wherein to live.

DAIRYING IN THE TIMBERED SECTION OF OTTERTAIL COUNTY

A. R. KNUDSON, PELICAN RAPIDS

My parents were among the early pioneers of this part of the state. This was a heavily timbered section, and the fields were limited in area on account of the hard work of removing the trees and stumps. The income from the sale of small grain was therefore low, and the keeping of cows was resorted to as the best means of meeting the living expenses.

The cows picked a living in the timber during the summer, and in the winter were fed wild hay. The feeding of grain was out of the question, for every acre of cleared land had to produce wheat in order that money might be raised to pay the taxes. The butter was made on the farm by mother, and exchanged at the cross-roads store at the rate of 8 to

10 cents per pound, for the necessities of life. And it was good butter at that.

I have seen the evolution of dairying on our farm and in our community from the early days of pioneering down to the present time. Step by step we have advanced from the most primitive methods of handling milk and its products to the present efficient management. In the old days the milk was set in stone jars, and the cream skimmed from it was churned at home. This method gave way in the early 80's to the plan of cooling the milk in deep cans set in tanks of water, and selling the cream to a local creamery. Then followed the cream separator and the cream station; then, last and best of all, our co-operative creamery which is now turning out a million pounds of butter a year and shipping the produce by the carload lot and paying cash for butterfat on the basis of quality.

I am sorry to say that the improvement in our cows did not keep pace with the improved methods of handling their product. Many herds are today fit relics of pioneer days; but in general the progress toward improved dairy cows and better feeding is steady and encouraging.

In 1908 we secured our first pure bred sire, a registered Holstein-Friesian, from the Minnesota Experiment Station. Three years later we milked our first grade cows; and they proved to be a great improvement over their scrub dams, and convinced us that there was something in the argument in favor of breeding cows for a special purpose. We decided to have some pure bred cattle of our chosen breed, and bought a heifer, but she produced mostly male calves, and was finally lost through sickness. Our venture in the pure bred business did not look bright then, but we were convinced that pure bred cattle would pay better even than the grades, and we bought four registered cows. The result

is that today we have a herd of registered cattle which we take pride in caring for and showing to our friends.

As our dairy herd developed more attention was paid to the care and feeding of the stock. Wild hay no longer has a place in our ration. It has been replaced by clover, alfalfa and silage. We follow no fixed rule as to the kind of grain that should be fed except that the bulk of it should be raised on the farm. In making up the grain mixture it is our aim to secure a ratio of one pound of protein to four and one half to six pounds of carbohydrates (starch and fat). A mixture which is giving us good results is as follows:

200 pounds of corn.

200 pounds of ground oats.

100 pounds of bran.

As our cows are giving well above 40 pounds daily we find it necessary to add 100 pounds of oil meal to this mixture. We feed the grain at the rate of one pound to every $3\frac{1}{2}$ to 4 pounds of milk.

It pays well to study the cost of the different items in the ration, as it will often be of advantage to substitute a cheaper grain for one which has for the time a higher market value. For example, in the above mentioned mixture it may often happen that barley may be cheaper than corn, and if so it may be substituted for a part or even the whole of the corn in the ration.

Our cows are fed all the hay (clover or alfalfa) they will eat, and about 30 or 40 pounds of ensilage, depending upon the capacity of the cow, and, as mentioned above, about a pound of the grain mixture to every $3\frac{1}{2}$ or four pounds of milk.

Beside the proper feeding we consider it very important to keep in mind five other things in connection with the care of the cows. These five are kindness, light, pure air, pure water and salt. Cows respond to kindness. All our stock may be approached and petted in the

It pays to study cost of different items in dairy ration.

A. R. Knudson of Pelican Rapids says that such a study may lead to substitutions of cheaper grains when prices on certain grains are high. Barley, for example, may be cheaper than corn and may take the place of a part, or the whole of the corn in a ration.

This is a practice advised by experienced feeders generally.

open lot; in fact most of them will come to us when they see us in the lot or pasture. Light in the barn is not expensive; neither is pure air. Pure water is harder to provide in a suitable manner and at a proper temperature. In our barn we have installed drinking cups which are supplied by underground pipes from a cistern in the hill back of the barn. This cistern is about ten feet higher than the floor of the cow stable. Water is pumped by power from the well into the cistern through underground pipes, so comes to the drinking cups at practically the same temperature as the water in the well. Salt is absolutely necessary to the health of the cows, and we make it a point to furnish it to them. Our plan is to put a little in each manger every second day before feeding the hay.

When we turn our cows out to pasture, usually the last week in May or the first of June, we continue the feeding of silage every morning before the cows are turned out. We also give them grain as usual and hay if they will eat it. In this way the change from stable feeding to grass is gradual and does not upset their digestion. Whenever the pasture becomes short ensilage is fed. The shorter the pasture the nearer we approach to the winter method of feeding. When supplementing pasture with green fodder like corn or oats we always bear in mind that a cow will need from 40 to 60 pounds of this roughage to secure about one half of the dry matter she consumes when stabled.

We always aim to give our cows a rest of six weeks between lactation periods. In this time the cow is given a chance to build up her system and grow a strong, normal calf. Alfalfa is fed in liberal amounts in order to supply the needed lime, and the grain ration during this period consists of corn, oats, bran and oil meal in equal parts. Each cow is given as much of this ration as she will clean up readily.

The week before the cow is to freshen the corn is left out of the feed mixture as a precaution against caked udder. Just before the cow freshens she is placed in a box stall and watched carefully and given assistance if necessary. The first three days she is given luke warm water to drink and small feeds of bran mash or bran, oats and oil meal. If her bowels are not moving properly we give her three fourths of a pound of Epsom salts or a quart of raw linseed oil. The fresh cow is gradually started on the regular feed ration. Her production during the lactation period depends to a great extent on the kind of a start she has at this time.

We always aim to keep our cows well fed in order that they may work at full capacity in producing butterfat.

Our surplus stock is sold for breeding purposes. If any animal in our herd should not come up to our standard in type or in production such animal is sent to market, as we do not sell anything for breeding purposes that is not all right in every respect. The bulk of our surplus stock is sold in our own neighborhood.

Keeps Careful Tab on Cows

P. A. ERICKSON, a Koochiching county farmer, who has a herd which produces an average of 304 pounds of butterfat a year, doesn't keep "boarders."

HE WEEDS them out by testing and weighing.

DAIRYING IN KOOCHICHING COUNTY

P. A. ERICKSON

Success in dairying like any other business depends on the largest possible net profit. This idea has always been foremost in my mind in building up my dairy herd of Holsteins. The first essential was greater milk production. Mr. A. J. McGuire while at the Grand Rapids Experiment Farm secured for me the first pure bred Holstein bull in the county as far as I know and he proved a splendid individual. Three other pure bred sires have been used since, so our cows now are mostly high grades. We have an abundance of clover for summer pasture. Our method consists of removing the timber and scatter five or six pounds of seed per acre among the stumps. In two years this is a solid sod of clover. We figure no charge against the cows

for pasturage as that item is offset by benefit to the soil and hastened decay of stumps.

Root crops such as mangel beets, rutabagas and culled potatoes are fed from 20 to 30 pounds a day in place of silage. Some dairymen are growing sunflowers and fodder corn for silage very successfully. Two tons per acre is an average clover crop for first cutting.

In 1921 my cows' average production was 9389 pounds milk, 304 pounds butterfat at a cost for mill feed of \$14.25 per cow. Last year my average was less as two of my best milkers contracted mammitis and were disposed of. Three heifers were fresh last year. The average production was 8330.4 pounds milk, 270.4 pounds butterfat at a cost of only

\$7.30 for mill feed per cow. They were fed 30 to 35 pounds mangels per day.

My highest production was in 1920. The average butterfat being 319 pounds, but the net income less because of high cost of feed and an excessive amount fed.

I have concluded that for the greatest net profit it is necessary to test and weigh the milk in order to determine which is the profitable producer.

Use as good a sire as can be afforded and keep heifers from the best producers only. Supplement grain with home grown feeds as far as possible. Feed succulent feed in the form of silage or roots. Keep

cows in comfortable quarters, use a tank heater in winter and never let them get hungry.

My surplus heifer calves are easily disposed of at \$15 to \$20 at 3 weeks. No attempt is made in this article to figure overhead expenses, net, on investment, etc. The skim milk for hogs, calves and chickens and the manure offset those items largely. My buildings are cheaply constructed, but warm and convenient. Not figuring interest and depreciation, but only labor and feed consumed at farm value, my cows last year made an average net return of \$50.80 each.

OUR HOLSTEIN HERD

CLINTON J. HOWLAND, RICE COUNTY

In April, 1920, when we sold the last of our grade Jerseys and Guernseys, we asked A. A. McPheeters, the Rice County agent, if he knew where we could get a few pure bred Holsteins and he helped us select 12 cows and heifers from the herd of Chas. Miller. Only five of these were milking then, but they were all well bred and good type and have produced well since.

Concerning their feed and care, I will start with the new born calf, as we think the size of the cow depends very much on the feed and care of the calf from infancy. We feed them whole milk for the first three or four weeks, then gradually change to skim milk and get them to eating ground feed and hay as early as possible and a little later we add a small amount of corn silage. We weigh the milk for each feed and feed only 6 to 8 pounds of whole milk twice a day, increasing to about 10 pounds after they are safely started on skim milk, always watching to prevent over feeding and judging by the size and appetite of the calf how much it will handle safely. We usually feed skim milk until the calves are 6 or 8 months old. We prefer to have our cows freshen in October and

early November when the threshing and silo filling are well out of the way. These fall calves we turn out to pasture with the cows late in May or in June, preferably after they have been without milk long enough so they will not be inclined to suck the cows. Those calves that come after Christmas we like to keep in the barn all summer, as they seem to make better growth during the summer when so protected from the flies and properly cared for. I believe that a good dry bed for the calf at all times is nearly if not quite as necessary as plenty of feed for a good, thrifty growth.

With our wild low land pasture we find it pays to feed a little grain all summer to the calves as well as the cows. Those who have tame pasture say their cows will not eat grain when they are turned onto fresh pasture, but we have had little difficulty that way, perhaps because we always used to plan to turn the cows out to pasture the 10th of May and this low pasture has hardly gotten started that early and consequently is rather short almost all summer. When we get the rest of our farm drained and under cultivation, I would like to rotate our pasture with the rest

of our fields and have some good legume pasture, either alfalfa or clover, or perhaps sweet clover.

We find alfalfa hay beats clover hay for milk production but it is harder to get it cured without rain on the first crop, as the time of cutting is usually rainy weather, about the middle of June and the second crop is ready about harvest time, while second crop clover comes after harvest and shock threshing usually. We have put our water tank into the barn the last two winters where the cows can stop and get a drink when we get ready to let them back in after cleaning and bedding them and feeding them. We let them outside twice daily (morning and evening) for fresh air and exercise, which they seem to enjoy after confinement in stationary wood stanchions. Our grain feed we grind one sack of oats to each sack of corn usually, but this year we had more oats and less corn, so are using three sacks of oats to two of corn, but the cows are coming through the winter slightly thinner in flesh than usual. We feed about one pound of grain for every four pounds of milk produced and buy only oil meal as a supplementary feed. We have substituted buckwheat shorts for the oil meal and could detect no difference in the milk yield, so whenever we break up new

ground, we sow buckwheat to rot the sod and then we have the buckwheat ground into flour and sell the surplus flour and feed the shorts the same as oil meal. We do not bother to bring the buckwheat bran home as I do not think it is worth while.

We hope to plant some soy beans this year to save buying oil meal. If they prove successful, we will not need to buy any feed for the cattle and only a little bran to mix with ground oats for the brood sows. We feed our horses what little hay the cows leave once a day and give them wild hay the rest of the time, and feed oats or corn or both to them, depending on which we have the most of.

After the calves have their allowance of skim milk, the hogs and chickens take what we have left. We have alfalfa pasture for the hogs and usually have a piece of corn handy to hog off and the hogs do very well on that combination. I often wish we had the farm all fenced hog tight, with lanes and gates conveniently arranged so we could open a gate into whatever field we are working in and at the same time shut the stock into whatever field they are pasturing in, thus being able to pass through a gate several times a day without having to stop to open and shut it every time through.

PUREBRED COWS AND GOOD MANAGEMENT GIVE DAIRY FARM FINE PROFIT RECORD

CHAS. F. COLLISSON, IN MINNEAPOLIS TRIBUNE

"High producers are money makers, low producers are mortgage makers," says R. C. Engberg of the division of farm management at University Farm after compiling data in a series of comprehensive cost of production studies made in Steele county in 1921. Three farms having a comparatively high average of production of 227 pounds per cow produced butterfat at

a profit of 11 cents per pound. Three neighboring dairymen with an average of only 135 pounds per cow were 13 cents "in the hole" for every pound of butterfat taken to the creamery. On the other hand, occasional instances of extravagant feeding, undue amounts of labor or similar abnormally high costs were found to nullify the benefits of high production.

Fisher Brothers' dairy farm near Owatonna, Minnesota, furnishes a very good example of comparatively high production of butterfat at a moderate cost, a combination that is hard to beat as a money maker. Down the road a short distance, in the same county, is another farmer whose cows produce less than one-half as much butterfat as the Fisher cows, but whose costs are still as high as the Fishers'. The effect of high or low production on the costs and profits of the dairy business on these two farms can best be observed by studying the accompanying table of the costs on both farms.

Fisher Brothers' cows averaged 233.5 pounds of butterfat for twelve months. This is butterfat actually sold or used in the house. This is not a spectacular production, since the average of all the 24 farms in the route on which records are kept was 170 pounds. One frequently hears of herds that average considerably more than that. But the advantage comes when they are able to get such production with no additional feed or labor cost and with very little additional total cost. For instance, their feed cost was \$40.20 for each cow. This is actually less than the feed cost of their neighbor, whose figures are given herewith, in spite of the fact that Fisher's cows were giving twice as much butterfat. This is the result of intelligent feeding and of good cows combined.

Fisher Brothers also receive large production with a minimum expenditure of labor, which is another large item of cost. The average labor requirement on all farms surveyed was 191 hours for each cow. But the Fishers used only 155, which is even less than that of their neighbor, who had a much smaller production. In computing the items of cost, labor has

been charged at the rate of $17\frac{1}{2}$ cents an hour.

The Fishers' low labor requirement may be partly explained by the fact that they use a milking machine the year around while their neighbor does not. Moreover, the milk house, containing the separator, the engine for the operation of the milker, utensils, and running water, is attached very conveniently to the cow barn, thereby eliminating considerable carrying of milk and utensils. The feed is also very handy. The silo is inside the barn, directly at one end of the row of cow stalls, so that silage does not need to be carried at all. Hay is in the mow right above the cow barn, as also are a few bins of grain.

Sometimes the advantage of high production may be lost by an extravagant use of labor, or perhaps of feed. One of the farmers had a high production of 258 pounds per cow, but he spent 326 hours of labor on each cow, which at the rate of $17\frac{1}{2}$ cents makes a cost of \$57 a cow. He received 25 more pounds of butterfat than the Fishers but he spent \$30 worth of time to get them. This same farmer had a very high feed cost. As a result his cost per pound of fat was very high in spite of his high production.

As a result of this combination of factors, the Fishers produced butterfat for 28 cents a pound in 1921, sold it for 50.5 cents, thereby making a profit of 22.5 cents for every pound sold and paying all costs, including $17\frac{1}{2}$ cents an hour for their time and market price for their feed. Their neighbor, on the other hand, produced his product at a cost of 61 cents and sold it for only 48.2 cents. The difference in selling prices is the difference paid by two different creameries.

The difference in the costs of these two farms was largely in the production. The cost of maintaining a cow

on these two farms was practically the same. It cost the Fishers just 71 cents less to produce 233.5 pounds of butterfat per cow than it did their neighbor to produce 108.7 pounds.

Now here is the marked difference between the kind of cows in these two herds. The Fisher cows are practically all pure bred or grade Holsteins. Some are registered and some are the result of several generations of pure bred sires which they have used for many years. The value of the cows will average about \$100 each. The other herd is composed entirely of grades, some of which are of non-descript breeding. Their value runs around only \$70.

High Producing Cows Pay the Big Profits

The following table compiled from actual surveys in Steele county by University experts, shows the low costs and high profits from Fisher Brothers' herd of large milkers, compared with a neighbor's herd of low producers.

Fisher Brothers' Farm Costs Per Cow.

Feed—

Hay, .7 ton	\$ 8.89
Silage, 2.9 tons	13.34
Grain, 1,186 lbs.	10.04
Oil meal, 102 lbs.	2.62
Pasture, 168 days.....	5.31

Total feed cost.....\$40.20

Man labor, 155 hrs.	\$27.12
Horse and tractor labor.....	3.32
Barn charge	3.55
Depreciation	.11
Interest on cow.....	6.50
Equipment charge	4.58
Miscellaneous cash costs.....	2.25

Gross cost, per cow.....\$87.63

CREDITS

Manure, 9.7 loads	\$ 9.70
Calf	4.11
Skim milk, 42.2 cwt.	8.53

Total credits, per cow.....\$22.34

Net cost producing butterfat...\$65.29
Lbs. butterfat, per cow..... 233.5

Cost producing one lb.\$.28
Average selling price, lb..... .505

Net profit per lb.\$.225

Other Farm

Costs Per Cow.

Feed—

Hay, .9 ton	\$ 9.95
Silage, 3.2 tons	10.77
Grain, 1,483 lbs.	14.23
Oil meal, 97 lbs.	2.41
Pasture, 173 days	5.34

Total feed cost.....\$42.70

Man labor, 171 hrs.	\$29.89
Horse and tractor labor.....	4.15
Barn charge	4.00
Depreciation .....	....
Interest on cow	4.22
Equipment charge	1.10
Miscellaneous cash costs.....	.25

Gross cost, per cow.....\$86.31

CREDITS

Manure, 11 loads	\$11.00
Calf	4.93
Skim milk, 19 cwt.	3.80

Total credits, per cow.....\$19.73

Net cost producing butterfat...\$66.58
Lbs. butterfat, per cow..... 108.7

Cost producing one lb.\$.61
Average selling price, lb..... .482

Net loss, per lb.\$.128

THE FARMER AND HIS CREAMERY

By J. R. KEITHLEY, UNIVERSITY FARM

There is produced annually in the United States about one hundred billion pounds of milk. This milk is used in various forms. About thirty-six per cent is used in the manufacture of butter. The annual butter crop of the United States amounts to approximately one billion six hundred million pounds. Of this amount about 60 per cent is made in creameries, and the remaining 40 per cent on farms. In Minnesota a larger percentage of the butter is made in creameries and largely in creameries that are co-operative in principle.

The farmer is interested in any creamery because it offers him a market for his dairy product. He is doubly interested in a co-operative creamery since its success depends upon his management of it—either directly or through his representative agent, the creamery operator.

Before a co-operative creamery can or should be organized a true co-operative spirit should prevail in the community where it is to be established. Enough butterfat should be available to permit a low overhead cost, and efficient, competent directors and operators should be secured. If a co-operative creamery has these three requisites it can be made to succeed very nicely.

The competent, efficient directors and operators having the co-operative support of the farmers concerned will be in a position to obtain, manufacture, and sell a high grade product at prices profitable to all concerned. Although it is an easy matter to name the factors making for success it is often a difficult problem to maintain and correlate them in such way as to insure continued or permanent success. The problems constantly arising and demanding solution necessitate careful, efficient service from the directors and the plant operators. There is no "rule of thumb" method that

can be prescribed. The good judgment of men must constantly shape the policy and enforce efficient management.

Minnesota has been and is fortunate in its co-operative creamery effort largely because it has the proper co-operative spirit and has selected capable men to direct it.

The belief has become more or less general that a successful creamery should draw from at least 100 patrons, 1,000 cows, have \$10,000 capital, and make annually approximately 200,000 pounds of good butter.

The farmer can aid himself and his creamery materially by producing on his farm clean cream, keeping it cold, and delivering it at least twice per week to his creamery. This can be easily done if utensils, separators, and cream cans are kept clean and dry when not actually in use.

The creamery operator can through proper methods of manufacture, if he receives good cream, make a butter which will command the highest market price. By carefully and regularly controlling the composition of the butter made the operator will make the maximum amount of good butter from a definite quantity of butterfat. If this is systematically done the creamery through efficient management, and maximum amount of high grade butter renders a distinct service to a community. Most of the creameries in Minnesota render such service.

Of the 170,000,000 pounds of butter produced in Minnesota approximately 66 per cent of it is made in co-operative creameries, 10 per cent in independent creameries, and 24 per cent in centralized creameries. Each group of creameries renders a great service to the farmer producer if efficiently and honestly directed. There are some localities in which each appears to be best adapted to give this

Elements of Success for a Good Creamery

100 patrons

1000 cows

\$10,000 capital

200,000 pounds of butter
annually.

SUCCESSFUL creameries mean farmers who produce clean cream, keep it cold, and deliver it at least twice a week to the creamery, and correspondingly efficient creamery management.

service. The number of creameries in each group varies slightly from year to year. In 1906 there were 555 co-operatives and 171 independents and centralizers while in 1920 there were 642 co-operatives and 188 independents and centralizers. This gives Minnesota approximately 830 creameries within her boundaries. The annual value of the dairy products of the state is reported to exceed that of any other industry within the state. Even the mining industry takes second place.

The farmer should constantly strive to improve his cows by improved feeding, selection, and breeding if he expects to receive greater returns through his creamery for his dairy product.

A study of yearly records of 18,014 cow testing association cows for the period 1910 to 1920 showed a rapid and almost uniform increase in income over cost of feed as production increased.

These records showed that cows giving 100 pounds butterfat per year produced an average income for the farmer above cost of feed of about \$10; at 200 pounds an average income of \$42; at 300 pounds \$72; at 400 pounds \$106 a year per cow. While the cows in the 400 pound class averaged four times as much in production as those in the first, they gave an average income over cost of feed that was more than ten times as great.

It has been estimated that the average dairy cow in this country produces yearly about 4000 pounds of milk containing about 160 pounds of butterfat. Feeding, selection, and breeding, could double this low average.

The farmer and his creamery can best be aided by increasing the production of the individual cows, thus reducing the overhead expenses, not only of production but in manufacturing.

MARKETING BUTTER COOPERATIVELY THRU THE MINNESOTA COOPERATIVE CREAMERIES ASSOCIATION

BY A. J. MCGUIRE, GENERAL MANAGER

The Minnesota Cooperative Creameries Association is composed of 426 cooperative creameries located thruout the state. They manufacture over 85,000,000 pounds of butter yearly, or over two-thirds of all the butter manufactured in the 600 cooperative creameries of Minnesota.

The Association was organized at a meeting in St. Paul, June 7, 1921, by delegates from over 300 cooperative creameries. It is purely a cooperative creameries' association, organized and operated by the cooperative creameries.

The Association did not come into existence as a result of one meeting, but had been under process of development for three years thru the creameries getting together in county organizations. There were fourteen county associations

when the State Association was organized, the first of the counties being organized in 1918.

The purposes and works of the State Association are many, but they may be summed up in one and that is to make more money for the cooperative creamery patrons. It has been fortunate that the Association was able to show a profit above cost for the creameries from the beginning, and it is this fact that has built up the membership of the Association to 426 creameries, and still growing, and will no doubt continue to grow until it includes all the cooperative creameries of the state.

Previous to 1918, when the county work of organizing the creameries to work together began, there was not a single creamery in the state shipping its

butter regularly under carload freight rates. Carload freight rates, which are from 40 cents to 80 cents per 100 pounds lower than local shipping to Eastern points, were secured by the centralizers for their large business. The cooperative creameries, by combining their shipments, could make up carloads and did so, and in less than two years' time the method of shipping butter by the cooperative creameries was completely revolutionized. Today, practically every creamery in the state is shipping in carloads. The Association is shipping over 250 carloads of butter a month, on which it is making a saving in freight for the creameries of over \$20,000 a month. The saving in freight alone has much more than paid the entire cost and operating expense of the State Association from the beginning.

The work the Minnesota Cooperative Creameries Association is attempting to do and is doing is to assist the creameries thruout the state to make a high quality of butter and to have it of such uniform quality that it can be graded and sold under certain established grades and under certain established brands; both grades and brands to be established by the creameries thru their State Association. A well and favorably known brand for any product in the business world is often considered of the greatest value of anything in the business. The cooperative creameries of Minnesota have gone on for thirty years making the best creamery butter in the United States but have never given it a name or brand as such. They could not while each creamery was working separately and making almost as many different kinds of butter as there were creameries. Working thru one Association they can make uniform butter within certain grades and they can brand their grades and make their brands known to the consumers.

High quality butter, uniformity, reduction in the cost of manufacturing, saving in freight, making the good quality of Minnesota cooperative creamery butter better known and securing a better price are the lines of work of the Minnesota Cooperative Creameries Association for the member creameries.

To make the Association a real cooperative creameries' association and to keep its control in the hands of the creamery men, the state was divided into 15 districts of 40 creameries to a district. Each of these districts has its own district association to look after the work within the district and to direct the work of the State Association. Each creamery has a director in the district association and each district association has a director in the State Association. As a matter of fact the State Association is patterned after the United States Government with each district representing a state. The success of the Association aside from the fact that it has made money for the creameries is due in a very large measure to the creamery men frequently getting together in their district associations. It is a common thing for from 80 to 90 per cent of the creameries to be represented at a district meeting. The State Association holds but one meeting a year, but the districts hold two and three meetings a year. We have heard creamery officers say that the good they got out of these district meetings by comparing notes with their neighbor creameries was alone worth all the cost.

We have not as yet touched on the actual cooperative marketing of the butter. Before you can conduct a successful marketing organization you must have the proper machinery and know how to run it. As a matter of fact the Association has not yet commenced the actual selling of the butter. It has been only helping each creamery to sell its

butter to better advantage and getting ready to help the creameries to sell collectively. There were so many other things that should be done first that the Association has followed the policy of doing one thing at a time and doing it well, and when some one thing was being done well and running itself so to speak, then take up something else. The Association is now prepared to sell the butter on a large scale but we shall defer a discussion of that to the end of this article.

The Association is financed first by each creamery buying stock in the Association at the rate of one share of stock at \$25 for each 50,000 pounds of butter made in 1920, the year before the Association was organized. The stock money has averaged a little over \$50 per creamery or about 35 cents per patron of each member creamery. The operating expenses are provided for by dues that have amounted to about a third of a cent per pound on butter shipped. Beginning Oct. 1st, 1923, the dues were lowered to a quarter of a cent per pound on butter shipped. This seems like a small amount when you consider the fact that the Association employs over 50 persons, over half of which are experts and that offices are maintained at St. Paul, Chicago, Philadelphia and New York. The dues amount to less than one pound of butterfat per creamery patron per month. This may seem impossible but it is true and it is possible on account of the very large volume of business. During July the Association handled 259 carloads of butter thru its New York office or over 7,000,000 pounds and over 6,000 cases of eggs in addition.

To get a clear idea of the work of the Association it is well to know the men who are employed and what they do. The Association is controlled by a board of 16 directors who are elected annually by the creameries. The di-

rectors must be officers or patrons of cooperative creameries. The whole board meets four times a year and its executive committee consisting of the president, first and second vice president and the secretary and treasurer meet monthly or as often as may be required. All the directors are paid by the day and for the actual time spent.

The regular work is carried out by the general manager and the managers of the different departments and eastern offices and a force of 15 field men, one for each district. The field men are in direct touch with the creameries, visiting each creamery monthly or more often as need be. The field men are expert creamery operators, men who were successful in running cooperative creameries. The Association also employs part time men such as creamery secretaries, who are exceptionally good in creamery accounting and who can spend a few days away from their work. When a creamery needs help with its books one of these men is secured. Other creamery men or creamery patrons who may be especially successful in certain lines of creamery work such as caring for cream on the farm, or getting cream station farmers to see the importance of their cooperative creamery, are sometimes employed to work with creameries needing their help.

It might be said in passing that every man holding a position of importance with the Association is a practical creamery man. The board of directors are creamery officers or patrons, the general manager worked with all the cooperative creameries of the state for years thru the dairy department of the Agricultural School and has always had his own dairy farm. The manager of the New York office and the Chicago office and the manager of the Machinery and Supply department were all operators of cooperative creameries in Minnesota at one time. The manager of the new butter

sales department was raised on a dairy farm in Wisconsin and later organized and operated one of the first cooperative creameries in the west. The assistant manager, who is in charge of the finances of the Association, was a cooperative creamery secretary and country banker before he came to work with the Association. So much for the men who are working for the Association. The creameries themselves are running it. Every line of work the Association is doing or planning to do has been approved by the rank and file of the creameries. If the Association is strong it is because it has kept in step with its member creameries.

The first work taken up by the Association was cream grading. A few years ago less than a third of the creameries were grading cream. It was thought that if a creamery started to grade cream it would lose patrons to the cream stations or to neighbor creameries. After the creameries got together in their districts grading soon became common and now in many of the districts every creamery is grading or preparing to grade. As a result the quality of the butter in many creameries has been greatly improved. The creamery that had the highest scoring butter at the state fair this fall was from a section of the state that two years ago was considered outside of the high quality butter zone. Creameries never know what they can do until they try. Farmers are very much the same the state over and when cream is graded and paid for according to its quality, the patrons will work for sweet cream. Instead of cream grading driving farmers to cream stations it has held them to their creamery thru getting a better price.

The field men working with the creameries of their different districts have created a new interest in not only better butter but butter of the right composition. The national pure food law

requires butter to contain not less than 80 per cent of butterfat and not more than 16 per cent of moisture. When creameries paid no attention to the composition of their butter they were often putting as high as 83 pounds of butterfat in a hundred pounds of butter thereby giving away 3 pounds of butterfat with every 100 pounds of butter, which at the present time is worth \$1.50, or during certain seasons of the year were putting more than 16 per cent moisture in the butter and running danger of being caught by the government and fined for making adulterated butter. Many creameries were caught with too much moisture in their butter and had to pay heavy fines, some of them running close to \$1,000.

The making of butter is no longer a matter of taking in cream and putting it in the churn and churning it. It requires the most careful and scientific work from taking in the cream to packing the butter. Fortunately there have always been many cooperative creameries in Minnesota that have done high class work, but there were many more that thru lack of knowledge and lack of equipment and sometimes thru lack of interest and care were turning out butter that was not a credit to the cooperative creamery business. The interest aroused by the creameries working together and the assistance of the Association are bringing about marked improvement. All the cooperative creameries are now coming to the point where they will use the best of up to date and scientific methods. It is to the interest and profit of the best cooperative creameries for all the cooperative creameries to be first class. Whenever a weak cooperative creamery is killed by the centralizers it weakens the strength of the strongest cooperative creameries. They are all in the same boat and in the long run they must all advance together or all go back together.

The making of higher quality butter and the saving in freight rates thru carload shipping were the first lines of work undertaken by the Association. When these were well under way, the Association took up the handling of creamery machinery and supplies for its member creameries.

Machinery and Supplies Department

A department for the handling of creamery machinery and supplies was established by the Board of Directors at their November meeting a year ago. The work was begun January 1st, and during the first eight months a business of over \$450,000 was done, and a net saving made for the creameries of \$40,000 over and above all the operating expenses of the department. Thru the large volume of business the Department was able to carry on the business at a cost of less than 4 per cent. The Department buys direct from the factories in carloads and sells at the regular retail price and refunds the savings in a patronage dividend. A patronage dividend amounting to \$40,000 was declared by the Board of Directors September 1st. Member creameries received as high as \$600 on their purchases for the eight months. This Department of the Association will easily average a business of over \$1,000,000 a year and will save the creameries over \$100,000 net in the purchasing of their creamery machinery and supplies.

Competition With Centralizers

For some reason the big centralizers operating in other states turned their attention to Minnesota soon after the Minnesota Cooperative Creameries Association was organized. It was probably a matter of now or never. In any event one of the largest centralizers has located creameries at three different points in the state this year and is still considering other locations.

At their first point of attack, the Association went in and gave them battle. Every farmer was informed of what this

particular centralizer was paying in other states where the cooperative creameries had been killed off, which in many locations was 10 cents per pound below the price paid by cooperative creameries in Minnesota. Pledges were circulated for the farmers to stay by their cooperative creameries. As a result this big plant has to ship in cream from neighboring states to keep running. But the fight is not by any means won. It is only beginning. It can be won by the cooperative creameries doing two things—first, to make better butter than the centralizers can make and get a better price for it; and, second, to sign up the patrons to the creameries for a period of five years. In Denmark, the greatest stronghold of cooperative creameries, no farmer can become a patron of a cooperative creamery unless he signs a 10 year agreement. In case he leaves the community before that time he is released and paid back any surplus he may have paid into the creamery association. The Minnesota Cooperative Creameries Association advocates a five year agreement, and will assist its member creameries to put such an agreement into effect during the coming year.

Cooperative Marketing of Butter

The latest and perhaps the most important step taken by the Association is for the cooperative selling or marketing of the butter. Plans for this work are now under way. One of the best butter salesmen in the United States has been employed by the Board of Directors to have charge of the work. He is Mr. H. F. Meyer. For the past six years he has been in charge of the Butter Sales Department for one of the largest and best butter firms of New York. For a number of years previous to this he was with the Bureau of Markets of the United States Department of Agriculture. The following is an outline of Mr. Meyer's plans for marketing butter cooperatively:

In the marketing of any product standardization as to quality and package is of utmost importance. Minnesota enjoys the distinction of producing more fine butter than any other state, but even at that the butter lacks uniformity as to flavor, texture, salt, color and package. The urgent need is to standardize Minnesota's butter so that it may be branded and a consumer's demand created for it.

Concentrating

In order to standardize the cooperative creamery butter, it was agreed that the butter shall be concentrated at St. Paul, Duluth, and at some point in southern Minnesota, possibly Albert Lea, where it may be inspected, graded, weighed, tested, branded and offered for sale in straight carload lots of certain grade. The Association has ample warehouse space back of their new offices where this much needed service may be rendered to the creameries. The Central Warehouse Company will furnish refrigeration, trackage, and switching service.

Shipping

The railroad companies have expressed their willingness to cooperate with the Association in rendering additional service in bringing the butter to the concentration point. The matter of obtaining "storage in transit" privilege for St. Paul and Duluth is now being taken up with the railroad companies. By shipping to a concentration point, cars for the East may always be loaded to full capacity, averaging 600 tubs.

Grading

One tub out of each churning will be opened and inspected by the official grader. He will examine the butter as to flavor, body, salt and color and place the shipment in its respective grade.

The butter will be classified as to the following commercial grades:

Sweet Cream Butter—(94-95 score) Association's specifications.

Mildly Ripened Cream Butter—(score 92-93) Association's specifications.

91 Score Butter.

90 Score Butter.

89 Score Butter.

88 Score Butter.

Weighing

A certain number of tubs will then be stripped and carefully weighed. If net weight marked on the tubs is wrong, it will be corrected, allowing 8 ounces for shrinkage in transit. In testing butter for net weight in the markets, the Association will recognize only tests to half pounds.

Testing

A small sample of butter will be taken out of each churning to be tested immediately for moisture, fat, salt and curd. If any churning shows it to be over moist, or deficient in fat, the shipment will be returned to the creamery for reworking.

Branding

The sweet cream butter and the mildly ripened cream butter, both made to a standard, will be branded, whether tubs, boxes or prints, and guaranteed by the Association. The brands will take the form of attractive labels, pasted on the side of the tubs and boxes, and large enough so that they cannot be removed by the receivers.

Selling

The various grades of butter will be sold through existing channels. Dealers in the markets will receive their regular supply in quantity, but not necessarily the same marks. All dealers may place standing orders for regular shipments of certain grades of butter based upon New York or Chicago market quotations. Prices on butter will be quoted either F. O. B. St. Paul, or F. O. B. Market.

Carting

The practice of charging creameries for cartage in the markets is an old practice long discontinued by dealers when making purchases in the markets or from large centralized creameries. The Association will not recognize, nor allow, cartage charges in the markets on outright purchases.

Billing

The butter sold will be billed out of the St. Paul office on date of shipment, less freight and icing charges allowed. Arrangements may be complete, whereby the Association will prepay all freight and icing charges to destination.

Terms

The customary wholesale terms of 10 days net, from date of shipment, will apply only to sales of butter on standing orders. All other sales will be made on basis of sight draft attached to bill-of-lading.

For Sweet Cream Butter

Butter made from sweet cream shall be recognized as the Association's best brand of butter. In order that sweet cream butter may be standardized as to quality, guaranteed and sold as real sweet cream butter, the following specifications must be strictly complied with by all creamery operators. Butter made that does not meet these specifications will not be permitted to be sold under the Association's best brand.

Raw Material

The milk or cream used for the making of sweet cream butter, shall at all times arrive at the creamery perfectly fresh and sweet, free from off-flavors, and objectionable odors. No individual can of cream testing less than 25 per cent butterfat, and over 48 hours old shall be accepted for this grade. The acidity of any can of cream accepted for the making of this superior brand of butter shall not be over **25 per cent**.

Pasteurization

The sweet cream shall be properly pasteurized at a temperature of not less than 145 degrees F. and held for 25 minutes, or heated to 180 degrees F. by the flash method. The sweet cream shall then be cooled to 46 degrees F. or lower and held **3 hours** before churning.

Churning

The sweet cream shall be churned under conditions and at a temperature insuring the required body and texture. The vat test shall not be less than **30 per cent** butterfat.

Quality of Butter

FLAVOR

The sweet cream butter shall have a mild, sweet and pleasing flavor, characteristic of fresh sweet cream.

BODY and TEXTURE

The sweet cream butter shall be firm and waxy, well worked and the salt and moisture well incorporated.

COLOR

The sweet cream butter shall be a light straw color, approaching the color between A and B on Nafis color rod. It shall be free from all streaks and mottles.

SALT

Sweet cream butter has a very delicate sweet flavor, which should not be lessened by an excessive salt content. In order to reach some uniformity as to the percentage of salt in the sweet cream butter, the following range is permissible:

Minimum of salt 2.00 per cent.

Maximum of salt 2.50 per cent

Sweet cream butter containing more than 2.50 per cent of salt shall not be sold under the Association's sweet cream brand, but be placed in a lower grade. The salt shall be so incorporated that there shall be no grittiness in the butter.

Score

Sweet cream butter made according to these specifications shall bear an Association's score of **94 to 95** points.

Packaging

In the selling of sweet cream butter the appearance of the tubs and boxes add to the value of the shipment. It, therefore, is necessary to pack sweet cream butter in containers that are at all times uniform in size, appearance and quality.

TUBS

Sweet cream butter to bear the Association's brand, shall be packed only in standard **spruce** tubs containing **63** pounds net.

Spruce tubs shall not be rinsed, soaked or steamed, but paraffined when dry.

Spruce tubs shall be lined with 30 pound stock parchment paper, overlapping one inch on top and bottom.

Spruce tubs shall be finished off neatly and uniformly by placing cloth circle on top of butter, and a parchment circle on top of the cloth circle.

No salt is to be used on the bottom, nor on the top, nor on the paraffined side surface.

The covers shall be fastened on with **4 Universal** tins, nailed one-half inch from the edge of the cover and extending down over the side of the tub. Tins should be nailed in opposite line with the grain of the cover.

Markings

In order that there may be uniformity in the markings on the side of the tubs and on the covers, the creamery operator shall use shipping tags, and tack them lightly on the side of the tubs, only, indicating thereon the name of creamery, number of the creamery, churning number, and net weight. Printed shipping tags may be had by placing orders with the Association's Supply Department.

The churnings shall be numbered consecutively, commencing with No. 1 on the first day of each year.

The shipping tag will be removed at the Association's warehouse where all the tubs will be numbered, branded, weighed and stenciled uniformly in definite places.

The creamery operator shall carefully weigh the empty tub without the cover, and pack only **63** pounds net, in each tub, allowing 8 ounces per tub to cover normal shrinkage.

Creamery Operator's Report

Every creamery operator shall make a manufacturing report (form to be furnished by the Association) to the Association's St. Paul office. The manufacturing report shall be signed by the butter-maker certifying to the accuracy of the report, and guaranteeing the butter to be real sweet cream butter.

Butter Marketing Agreement

The Membership Agreement, entered into between the creamery and the Association, contains provisions for the marketing of butter on a strictly cooperative basis.

To strengthen the general clauses of that agreement, and to make clear the manner in which the butter should be marketed and the proceeds divided, it will be necessary that all member creameries sign also a Butter Marketing Agreement.

This Butter Marketing Agreement contains in simple form the following important provisions:

1. The creamery agrees to consign to the Association, the same as it is consigning now to some dealer, its make of butter for a period of two years.
2. The Association agrees to receive, grade, brand, and sell the butter for the best price obtainable.

3. The net proceeds for each grade of butter sold will be remitted to the creamery less the expenses incurred in grading, labeling, handling and selling of the butter.

Fortunately the Association has been able to save a good amount of the dues paid in by the creameries and has a splendid operating fund of over \$100,000 to carry on this new work. It may now be said that the Minnesota Cooperative Creameries Association is in position to do anything its member creameries want done to advance and to protect their interests.

The Association is publishing a little 4 page paper that gives a monthly review of the cooperative creamery busi-

ness. It is sent free to all the cooperative creamery directors, officers and operators of the state. It can be had free by any cooperative creamery patron who will make request to the Minnesota Cooperative Creameries Association, Hampden Ave. and Charles St., St. Paul, Minn.

Creamery officers and patrons are invited to visit the Association headquarters at any time at the above address. It is about midway between St. Paul and Minneapolis, three blocks west and one block north of the Minnesota Transfer bridge.

Letters on any line of cooperative creamery business are invited and promptly answered.



Kittson County cows are beginning to rival wheat in importance.

HOME MADE CRIB SILOS FOR TIMBER LAND FARMS

By E. W. SMITH, UNIVERSITY FARM

The type of silo here described is not recommended for general use in the prairie sections or the older settled parts of the state, but is offered as a suit-

able plan for farmers in the timbered sections who want to build silos of the materials at hand, and by their own labor.

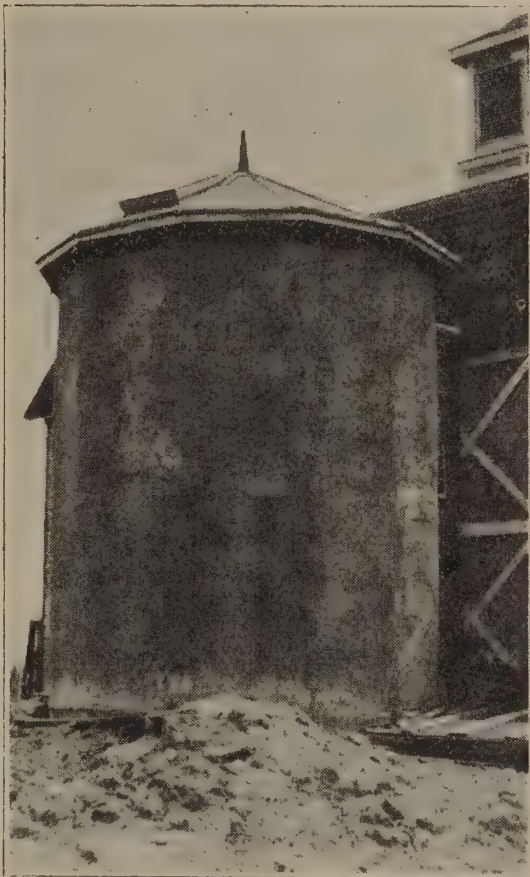


Fig. 1. Silos With and Without Outside Coat of Plaster.

Most of the farmers in the cut-over sections of the state have timber which may be cut up into 2x4 stuff at the local mill or by a portable mill; and almost any pioneer farmer who is handy with tools could build and plaster a crib silo such as is here described without having to hire any skilled labor.

The average settler in the timbered sections is hardly able, financially, to afford any of the silos on the market. Cash is a rather scarce article with him and all he can get is needed for other purposes. He keeps a few cows, and would be better off if he had more cows.

He could keep more cows, and the cows he already has would yield a better profit, if he had a better way of providing winter feed for them. The silo will enable him to do this.

A crib silo such as is here described may be built of common, roughly sawed 2x4's of any native timber. Very rough lumber is even better for the purpose than smooth lumber, for it will better hold the plaster coat (mentioned later). The writer personally knows of about a dozen silos built after this plan, which are giving satisfaction.

Laying Out the Plan

All the pieces for the cribbing are sawed exactly alike. To make a pattern for them use a piece of board 4 inches wide and 7 feet long if the silo is to be 12 feet across, or 6 feet in length for a 10-foot silo. Lay a carpenter's square on the board as shown in Figure 2, so that the measurement on the blade of the square from edge of board to corner of square is 6 15-16 inches, and the corresponding measurement on the beam of

the square is exactly 12 inches, and mark for sawing off the corner as shown in the cut. The same thing is done at the other end of the board as the cut plainly shows. This method will give the proper angle so that when six of the pieces of cribbing made from this pattern are placed together as shown in Figures 3 and 4 a perfect hexagon will be formed. It is a good plan to build a frame of several thicknesses of the cribbing to be used as a form in laying out and constructing the foundation.

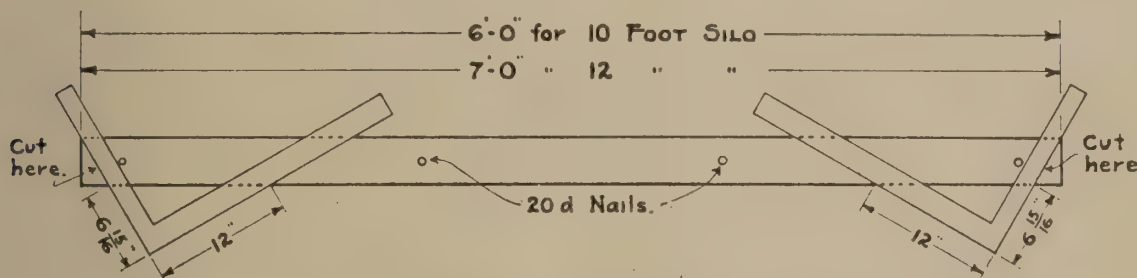


Fig. 2. Method of Making the Pattern.

The Pit and the Foundation

Where the drainage and the nature of the soil will permit, it will be economical to dig a pit for the lower part of the silo. It should be kept in mind, however, that silage is heavy material to lift and it will not be economical of labor, as a rule, to have the pit deeper than 6 feet. It will usually be found best to build a regular concrete wall from the bottom of the pit to some distance above the surface of the ground or the floor line of the stable. It will be noticed that the wall shown in the diagram extends up on the outside of the first layers of woodwork. This method serves to anchor the upper structure firmly to the base.

Building the Silo

Figure 4 shows how the 2x4's are placed on the foundation. Each alternate layer is laid so that joints are broken as shown and each piece is fastened with four 20d nails; the nail at each corner passing down through the next lower piece on the adjacent side of

the silo. By this method of nailing the whole is securely and rigidly held together.

It must not be supposed that full length pieces only may be used. On the contrary, short pieces may be worked in to advantage, as all joints will be covered by the plaster coat which is finally applied.

How Doors Are Made

The doors, in the side of the silo are 2x2½ feet in size and placed 2½ feet apart. The door frames should be made of 2x5½ inch lumber as shown in the diagram. The frame should be set in place as the silo is being built and should project ¾ of an inch both inside and outside of the 2x4's. This projection will allow for the thickness of the plaster and make the frames flush with the finished surface. The doors are 2x10 inch planks sawed 2 feet long. Three pieces just fill the door frame. A cleat is nailed on the door frame the right distance from the inner edge so as to hold the inside of the door planks flush

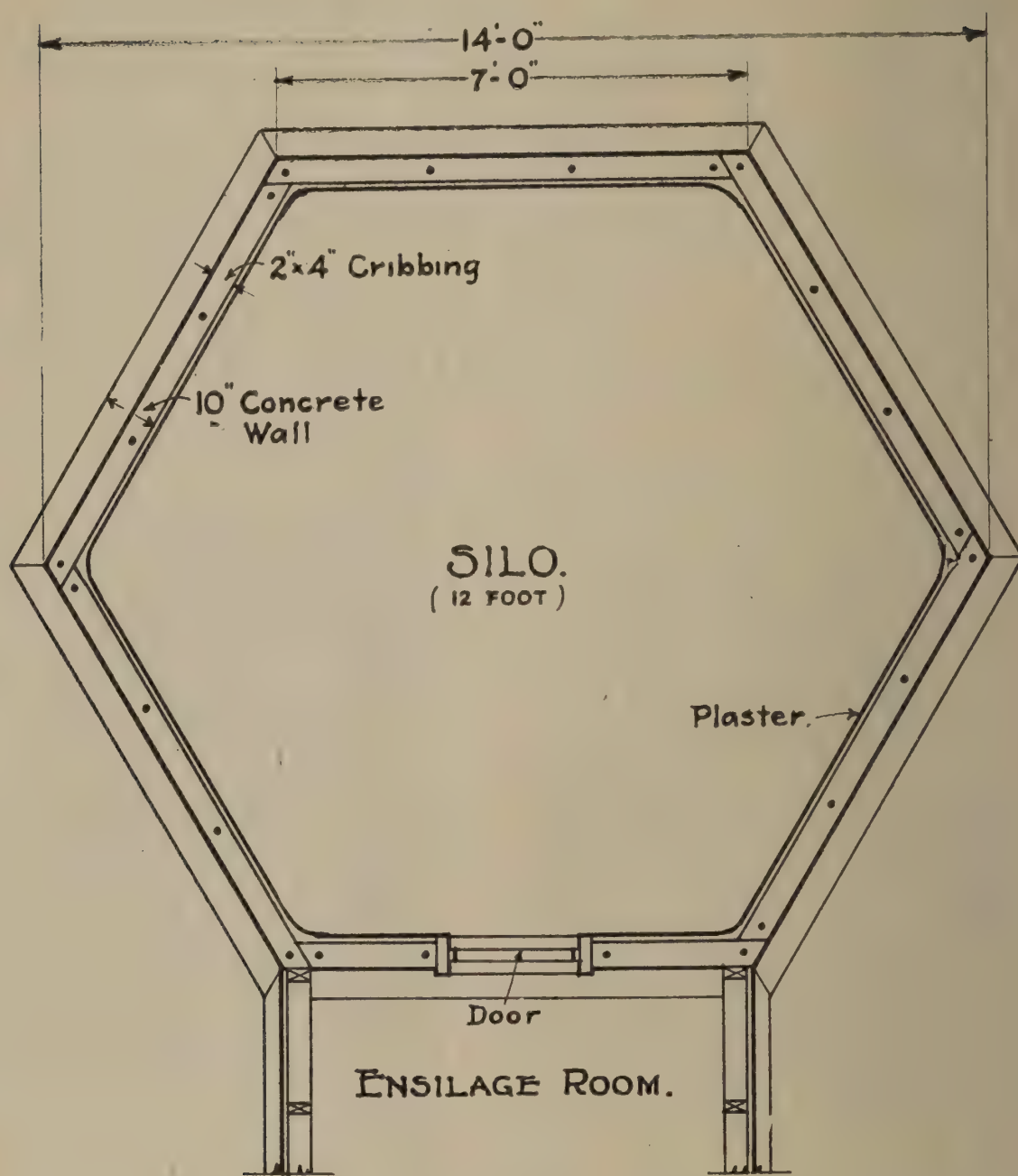


Fig. 3. Plan of Silo

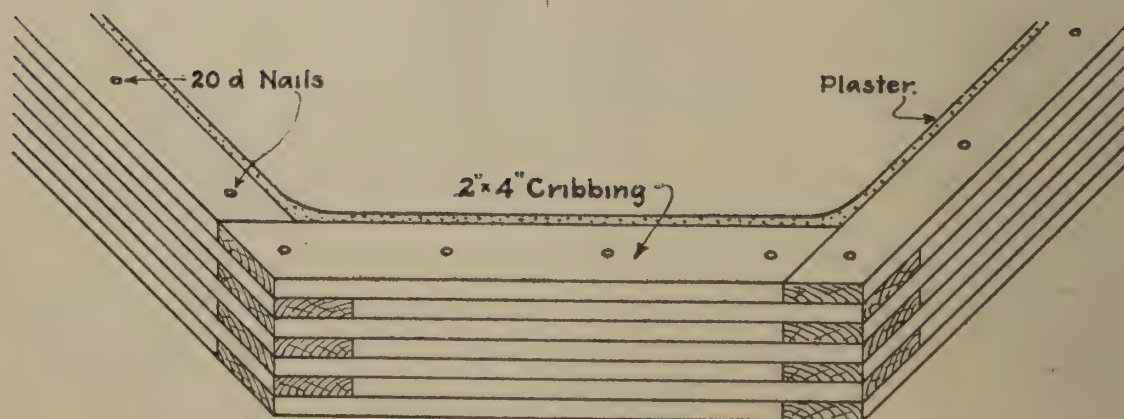


Fig. 4. Method of Laying Cribbing and Rounding Inside Corners in Plastering

Northern Farmers Building Crib Silos

Crib silos are built from material taken from
the farm's wooded areas and with home
labor

Methods of construction are fully described
and illustrated in the article which
accompanies this

The crib silo opens up new possibilities for
dairying on the farms of northern cut-over
lands

with the inside of the frame. The silage will hold the doors from falling in and the cleat keeps them from being crowded out.

Constructing the Roof

When the frame work is complete, place the main rafters, one at each of the six corners pointing toward the center, where a fence post 8 inches in diameter and sharpened at the top is used for a center piece. Use one common rafter between each two main rafters.

Anchoring

When the pit wall is being constructed it will add strength to the structure if one end of a piece of fence wire about 30 feet long is cemented securely into the pit wall at each corner. This can be done by fastening any old casting to the end of the fence wire and cementing casting into the wall. These wires should be left in the pit until the rafters are on, then should be brought up in the corners over the rafters at the plate and drawn down for at least four to six feet and stapled securely to the woodwork. This arrangement will securely anchor the roof to the main structure. A four-light window frame should be placed where the blower from the silage cutter is to enter the roof, and the rest of the roof is to be covered with prepared roofing.

Plastering the Inside

In putting on the inside coat of plaster, begin at the top and work down. The first coat should be made of one quarter lime and sand and three quarters cement and sand. To prepare this, first mix the lime and sand into a good, rich plaster in the usual way. This plaster should contain some plaster hair. About one bushel of hair should be enough for an ordinary silo. Next mix dry one part cement with four parts of good sharp plaster sand, then wet it enough for plaster. Use about one part of the lime plaster with three parts of the cement

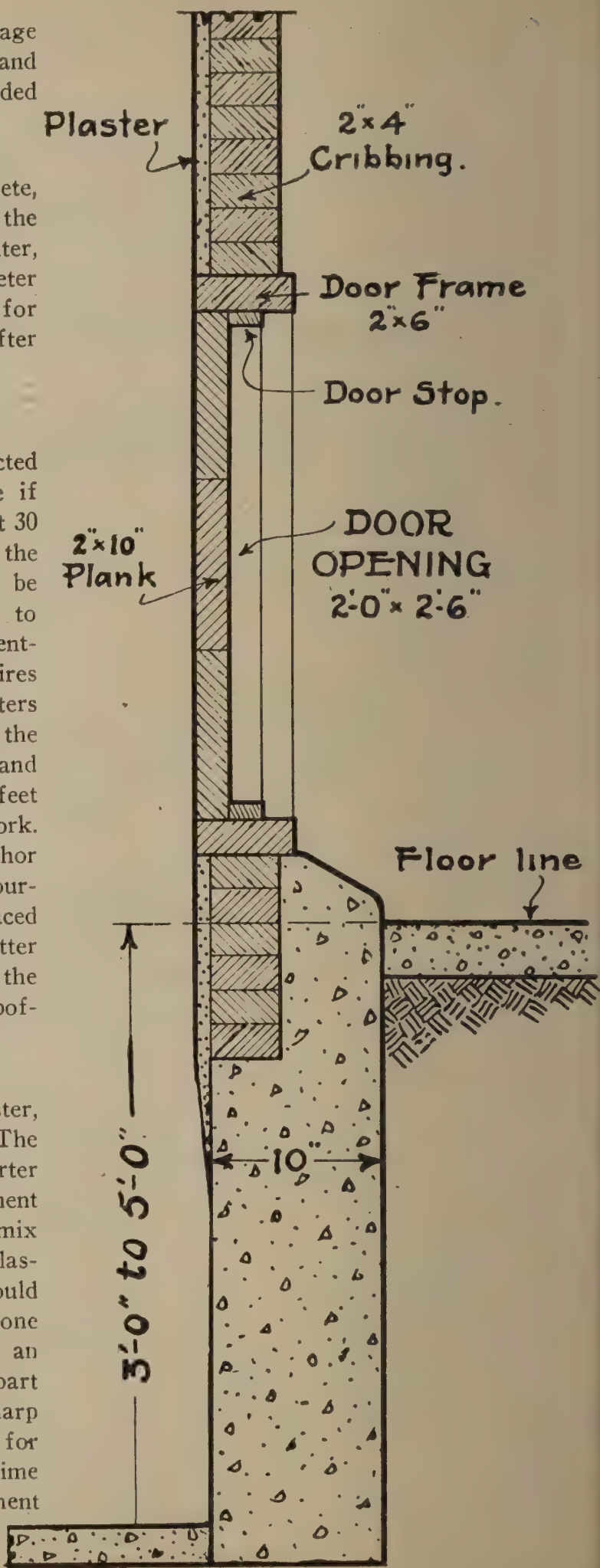


Fig. 5. Section of Wall, Foundation, and Door

plaster, mix thoroly and apply to the wall. The lime helps to make the plaster spread better as well as stick better and it will have a greater tendency to give

wide with battens over the cracks are sometimes used. A very cheap, but not durable, covering would be one thickness of prepared roofing fastened with lath.



Fig. 6. Corner of Crib Silo Showing Rough Lumber Used

and take with the swell and shrink of the wood than would the cement alone. The first coat should be $\frac{1}{2}$ inch thick. The second coat should be applied at once and should consist of one part cement and two parts sand. This should be put on $\frac{1}{4}$ inch thick and should be finished with brush and trowel. The surface should now be perfectly smooth and when it has dried will be as solid as stone.

In putting on the first coat the corners may be filled rather heavily, thus rounding them somewhat. This is shown in Fig. 1.

After the plaster has dried, it may be washed with clear cement and water to fill up any fine season cracks that may have formed.

Finishing the Outside

To finish the outside, one of several coverings may be used. Flooring put on perpendicularly, or boards 12 inches



Fig. 7. Silo 8 Feet in the Ground and 8 Feet Above

This silo cost \$16 60. It will be built higher as demands and circumstances permit.

The most durable covering is stucco or plaster the same as that put on the inside. The writer has known some of these crib silos to be used for five years before any outside covering was put on.

Suggestions

It is not advisable to build this type of silo less than 10 or more than 12 feet in diameter or more than 24 feet high.

If the herd, as well as the clearing on which the silage is to be grown, is small, a farmer may build on the installment plan, that is, build as high as his needs require the first year, but not putting on a permanent roof. He can then add a few feet the following year and, if need be, not finish for three or four years.

Remember that the plaster is to be applied directly to the cribbing—no lath being used. Therefore the builder will realize that waney edge pieces, knot holes, and lumber of slightly uneven widths will serve better than perfect material.

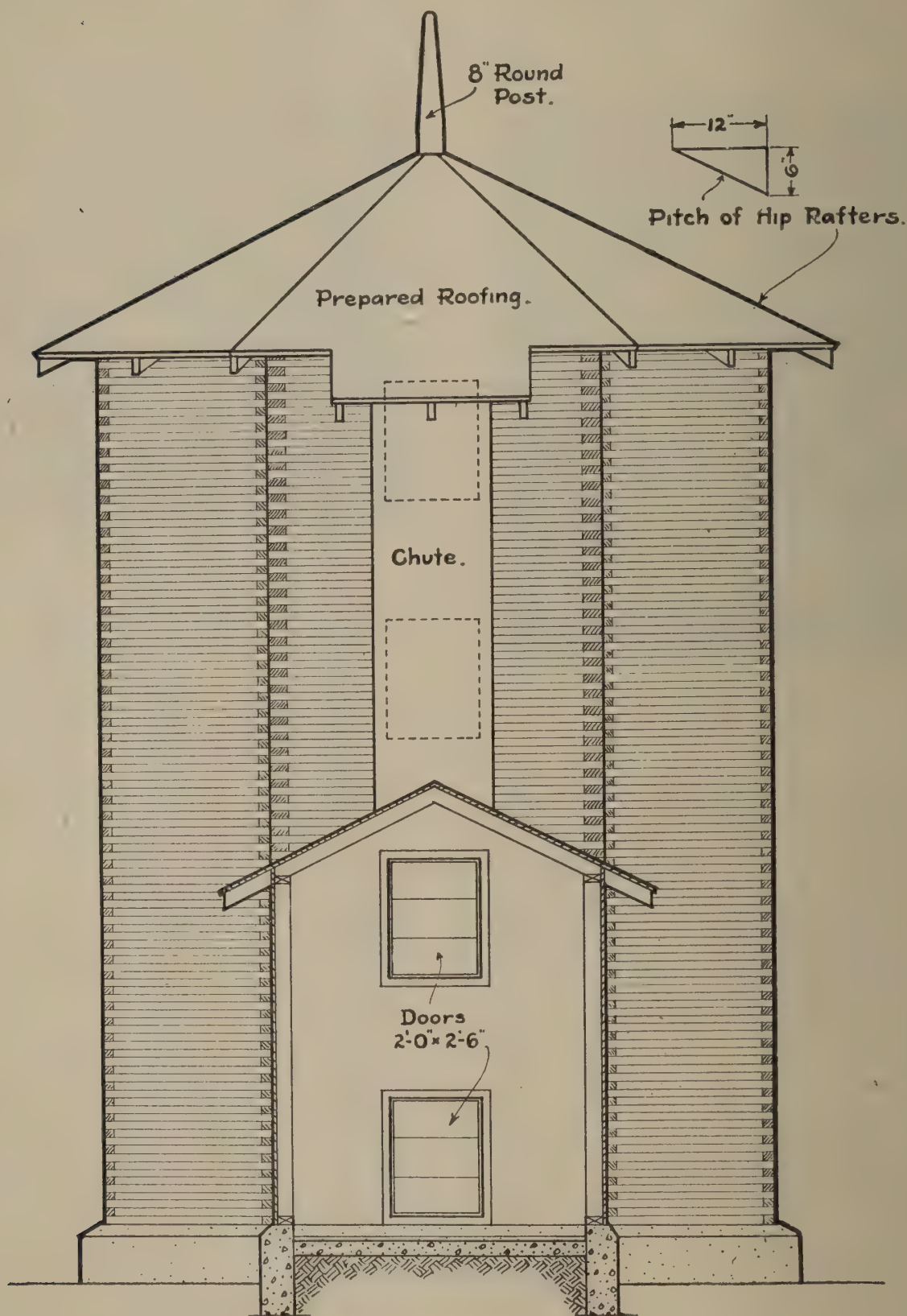


Fig. 8. Architect's Drawing of Front Elevation of Crib Silo

DAIRY BARNs AND STABLES

H. B. WHITE, UNIVERSITY FARM

A well planned and well built barn saves labor, makes the work more pleasant, decreases the loss of young animals, prevents waste of feed, increases milk supply and comfort of animals. A dairy barn needs to be carefully planned in order that it may be convenient and properly located in relation to the other buildings. In most cases it is desirable to have it stand north and south so that the two rows of animals will each receive the benefit of the sunlight, one row being most favorably located for the morning sun and the other for the afternoon.

The slope of the ground or other conditions may make this location impossible. It is desirable that there be good drainage of the yards adjoining the building as mud holes are a source of dirty milk and sore teats.

Under ordinary farm conditions the cows are usually sheltered in the same barn with the horses. Such a barn is usually called a general purpose barn. This is not the best arrangement as the dust flies and odors from the horse stable are not desirable where high grade milk is to be produced. In many cases the horse stable should be a separate building or an ell or separated from the cow stable by a good partition with doors that are kept closed as much as possible. Where possible the horses should be placed at the north end of barn, thus leaving the warmer part of barn for the cows and calves.

The construction may vary considerably. Hay or straw over poles will make a very comfortable shelter, but for many reasons more permanent construction is desirable. Lumber, concrete and hollow building tile are

used to make very sanitary and comfortable dairy barns. The storage of feed overhead and the ease of removal of litter make such construction very satisfactory. Attention should be given that there is sufficient lighting in both the temporary and permanent shelters. A square foot of window to every twenty-five square feet of floor is necessary. Barns built on concrete foundation walls and of good materials and construction do not deteriorate at the sills and consequently last a long time and prove a good investment.

It is usually convenient to stand the cows in two rows either facing in or facing out. There are points in favor of each way, but the possibility of the installation of a milking machine makes the facing out the most popular at present. There are some barns where the rows run across the barn but this usually necessitates a number of doors for the cows to be let in and is not so simple in the construction of the floors and arrangements of the stalls as where two rows are stood lengthwise of the barn.

Floors and manger are usually made of concrete, although in expensive barns cork brick are found very satisfactory and not so cold for the animals to lie upon. Hollow tile in concrete floors improves the condition in cold weather. Concrete for barn floors should be placed by someone familiar with the handling of it. Good concrete requires that the cement in the sack has been kept dry, that the aggregate (sand and gravel) be well graded (not too much fine sand) that the cement, sand and gravel and water be mixed in proper proportions, that the materials be mixed thoroughly,

that the concrete be placed immediately after mixing and be protected from drying for at least four days and from freezing at least two days.

Cement Work

In cement work a 1-2-4 mixture means that to each sack of cement there are two cubic feet of sand and four cubic feet of gravel or crushed stone. The sand fills the spaces between the particles of gravel and the cement fills the spaces between the particles of sand. Thus is formed a solid mass having great strength. If

the proportions are not correct, a porous mass is the result and it will not be permanent.

Sand passes through a No. 4 screen, that is, a screen having four spaces to the linear inch. The spaces are about five inches long. Gravel is retained by a No. 4 screen. The screen is set at an angle of 45 degrees.

Mixtures

The following table gives the mixtures commonly used for various kinds of work:

Thickness		C.S.G.	C.S.G.	
Basement floor	4 inches	1-2-4	Tanks or troughs	1-2 -3
Poultry house floor	3 inches	1-2-4	Posts	1-2— -3
Hog house floor	3½ inches	1-2-4	Walls	1-2½ -5
Cow barn floor	4½ inches	1-2-4	Blocks	1-2½ -4
Horse barn floor	5½ inches	1-2-3	Foundations for machinery ..	1-2½ -5
Sidewalks	4½ inches	1-2-3	Mortar	1-2

Quantity and Volume Table

The table below gives the quantity of cement, sand and gravel for one cubic yard of mortar or concrete. It also gives the quantity obtained when a one-sack batch is mixed.

Mixture	C.S.G.	Quantity required for 1 cu. yd			Volume for 1-sack batch	
		Sacks of cement	Cubic yards of sand	Cubic yards of gravel	Cu. ft.	Cu. yds.
1		30			.9	.033
1-1		19.4	.70		1.35	.05
1-1½		15.4	.82		1.75	.065
1-2		12.8	.90		2.02	.075
1-2½		10.8	.96		2.50	.092
1-3		9.4	1.00		2.70	.10
1-4		7.9	1.04		3.40	.125
1-5		6.1	1.08		4.05	.15
1-6		5.6	1.19		4.72	.175
1-1 -2	-2	9.2	.35	.74	2.50	.092
1-1½ -3	-3	8.0	.42	.85	3.50	.13
1-2 -3	-3	7.4	.52	.78	3.90	.144
1-2 -4	-4	6.0	.44	.90	4.30	.16
1-2½ -5	-5	5.2	.46	.91	5.2	.19
1-3 -5	-5	4.9	.52	.86	5.8	.215
1-3 -6	-6	4.4	.46	.94	6.1	.225
1-4 -8	-8	3.4	.48	.96	7.9	.29

The Milk House

It is usually better to have the milk house in a separate room ten feet or

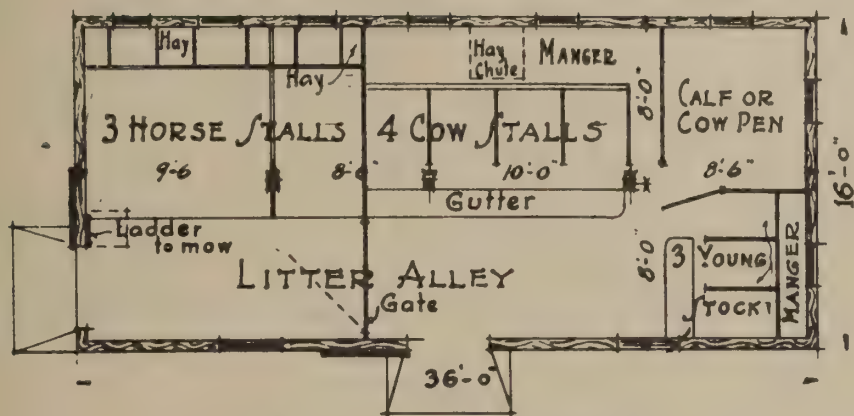
more from the barn. A passageway or vestibule may be built with a door next to the barn and one at the milk room. The milk takes up odors so easily that it should be removed from the barn as soon as possible.

Stable Equipment

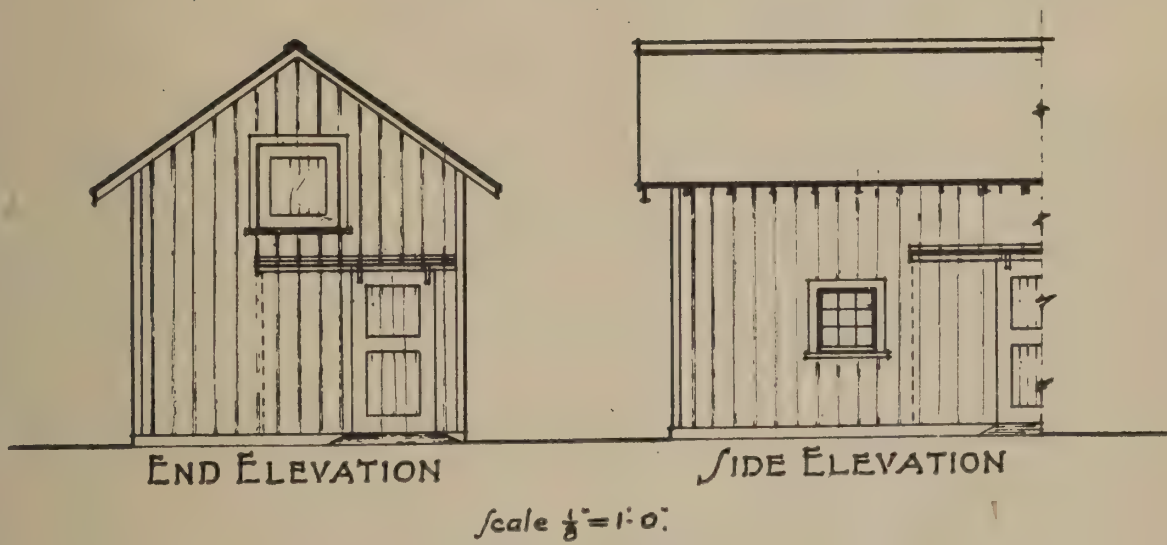
A great deal of labor is saved by having such conveniences as stanchions for the calves. These are used at feeding time only, but are a necessity if best results are to be secured.

Drinking cups are a good investment. They pay for themselves in increased production in a good herd and then earn a profit for the owner. The cows are quickly responsive to the supply of water available at all times, especially in cold weather when the chill of going to a water tank uses up a large amount of energy which might otherwise be used in milk production.

Feed carriers and feed trucks may be home made or purchased of the barn



FIRST FLOOR PLAN
scale $\frac{1}{8}" = 1'-0"$



END ELEVATION

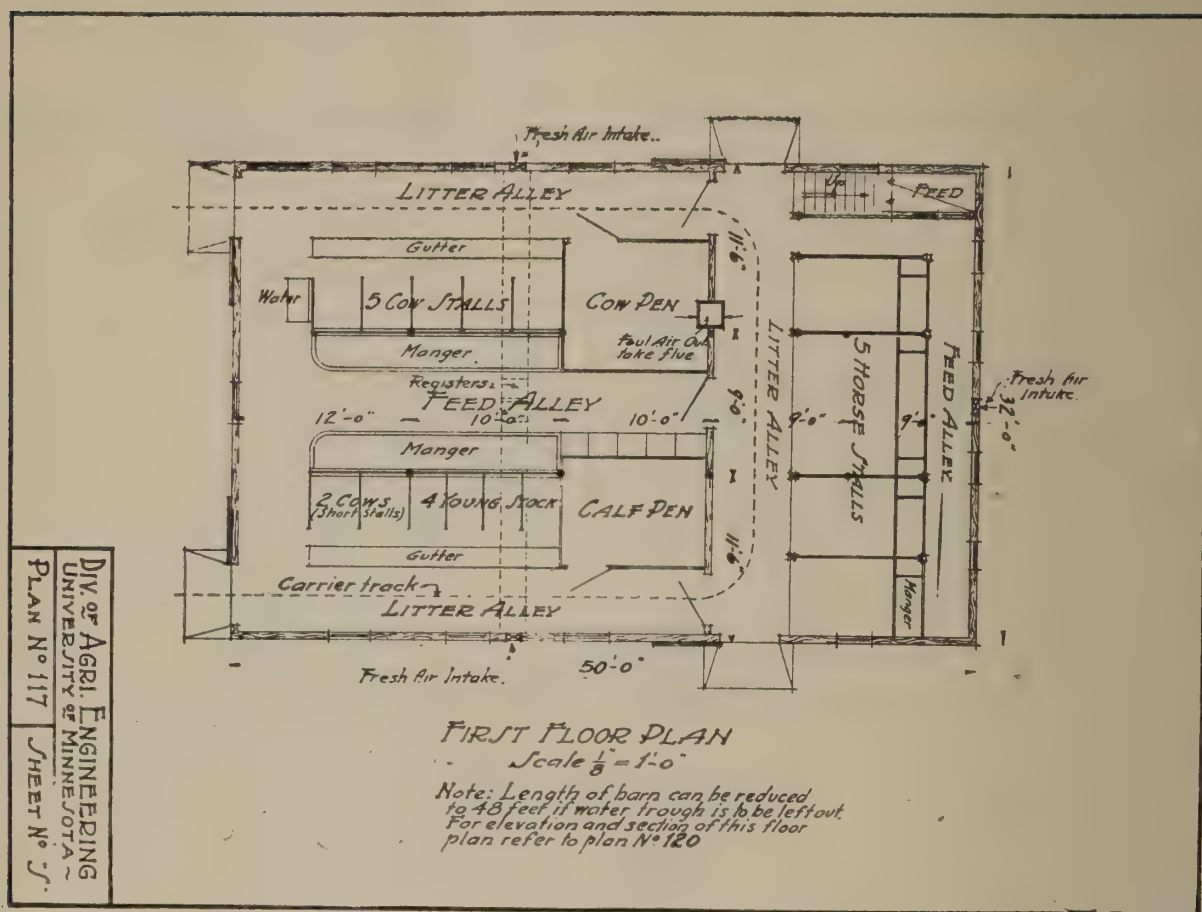
SIDE ELEVATION

scale $\frac{1}{8}" = 1'-0"$

DIV. OF AGRI. ENGINEERING ~ UNIVERSITY OF MINNESOTA	
PLAN N° 115	SHEET N° 5

A272

Plan 115. Barn for a small farm.



Plan 117. Barn with cows facing in.

equipment manufacturers. They reduce heavy labor and permit more attention being given to the needs of each animal. The same is true of litter carriers or facilities for driving thru for removal of manure in large barns.

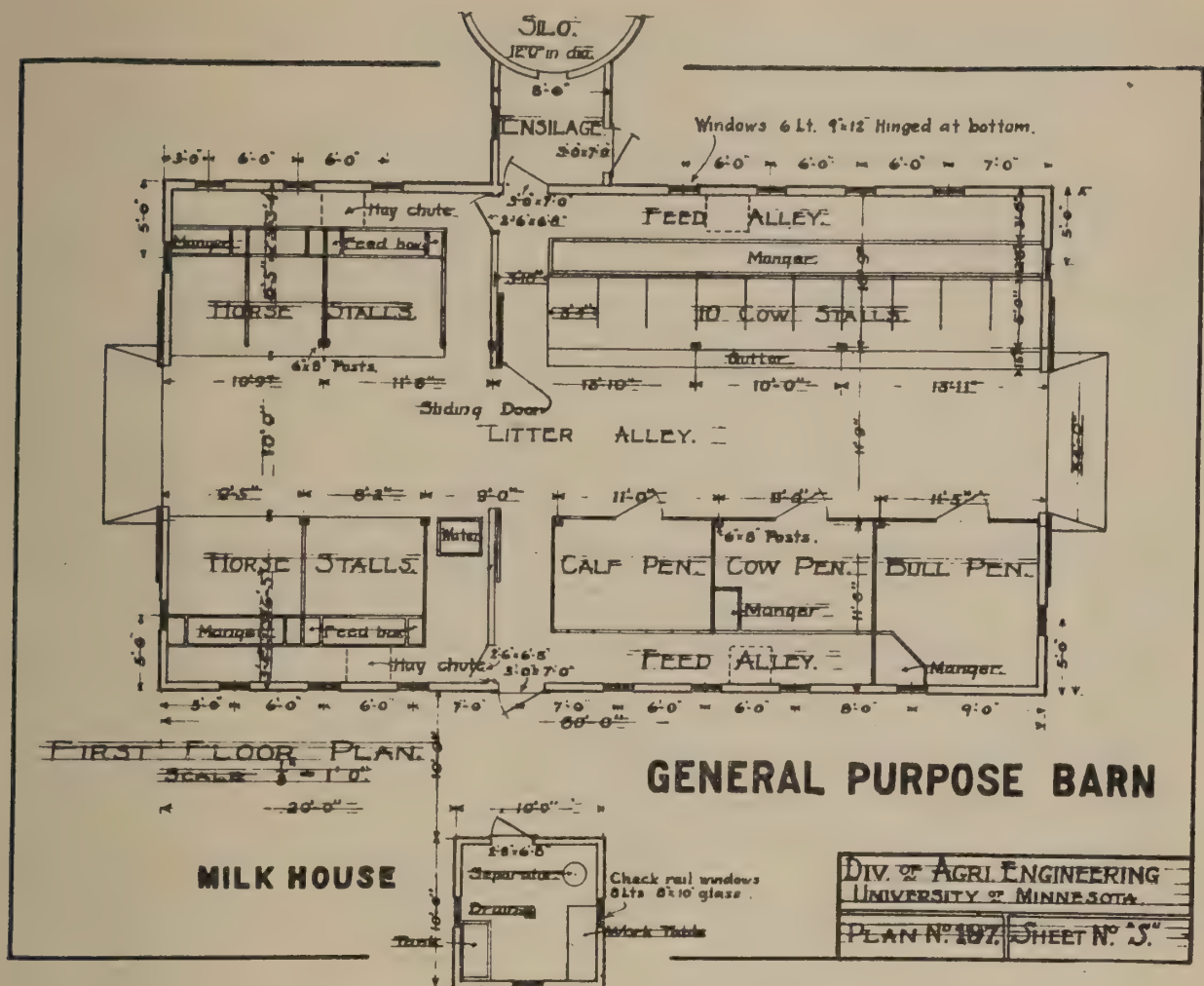
Ventilation

The ventilation of a stable or barn varies considerably just as the draft of different chimneys varies. A barn of ordinary height, or about 30 feet, will require about a square foot of outtake flue for five cows. If the barn is built tight and warm the intakes will need to be nearly as large. Usually more intakes are built than outtakes. Each one is smaller and thus drafts are avoided. It is important that they be easily closed or during windy weather it will be impossible

to keep the barn warm because the wind blows in the intakes on the windward side of the barn. Many barns have so many openings around doors and windows that it is a good plan to have hinged winter doors inside the barn where there are sliding doors and also storm sash over the windows in Minnesota barns.

It is usually difficult to care for young animals in a small barn. Plan No. 115 shows a barn 16x36 feet in which three horses, four cows and two or three young animals besides calves or a cow may be sheltered. The location of the door at the side makes it convenient for turning animals into the yard as well as for the removal of manure.

Where a considerable number of cows are to be sheltered a single row

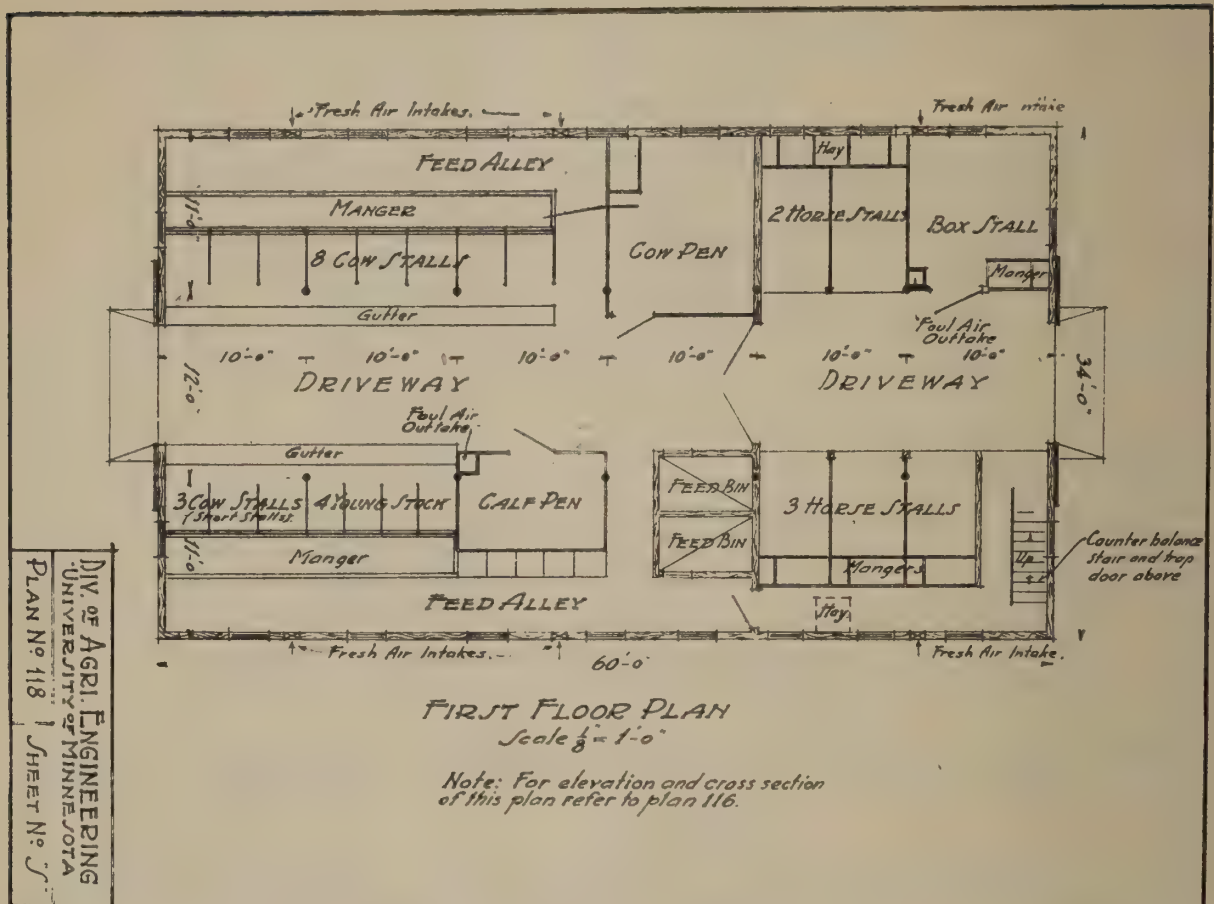


Plan 197. General purpose barn, 34x60.

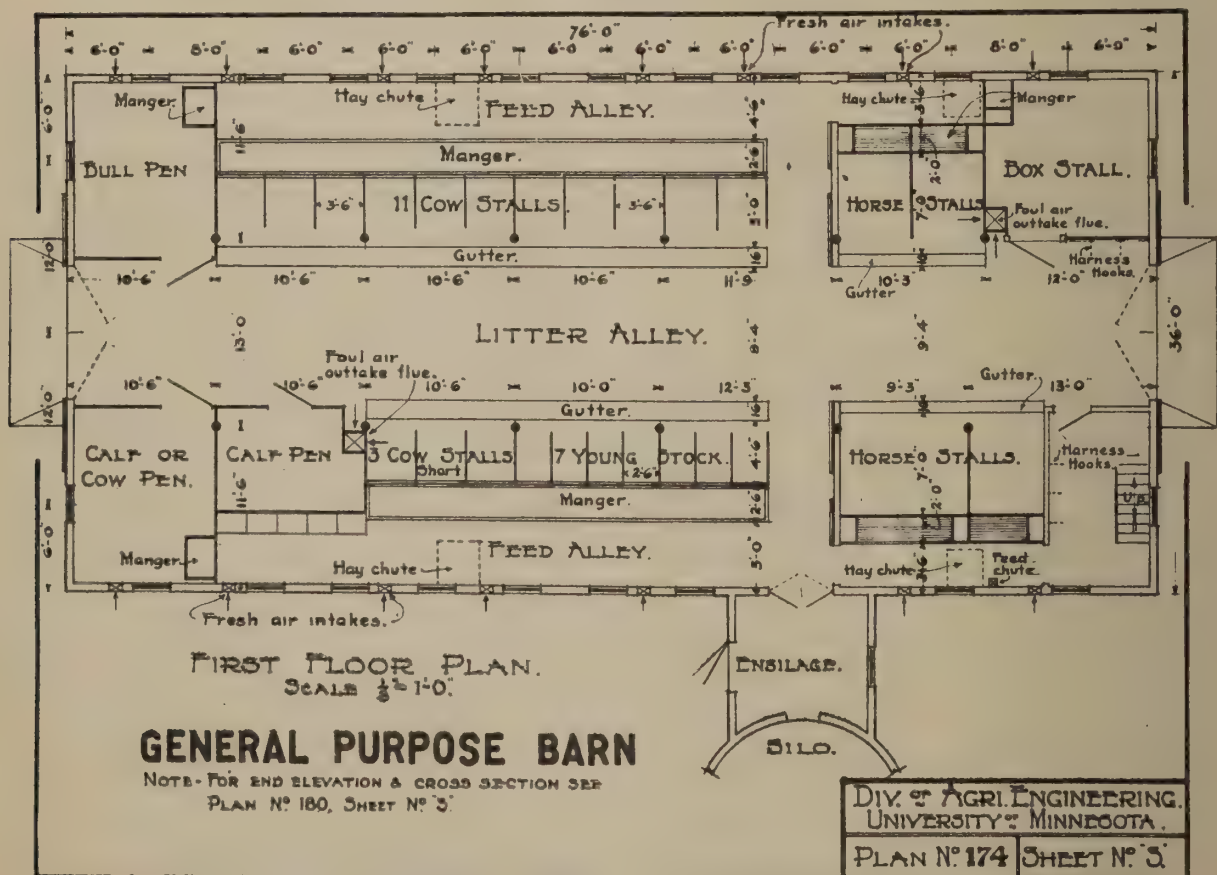
requires a long narrow building which is not as economical as one more nearly square. The common practice is to place the cows in two rows facing either in or out. Plan No. 117 shows a barn 32x50 feet which may be built 48 feet long if water trough is omitted. In this case two more cow stalls are available. It is often found desirable to turn the horse stalls so that the feed alley is next the cow stable part of the barn. In the plan as shown the litter carrier can be used in the horse stable to good advantage. The cows face in and are fed from one alley. The hay chutes being located in the middle of the barn, one at the end for the horses and the other about the middle lengthwise of the cow stable.

On a number of farms it is desirable to drive through lengthwise for the purpose of removing the manure. A barn 34x60 feet is shown with this arrangement in plan No. 197. It shelters eight horses and ten cows and has a calf pen, cow pen and bull pen. It may be desirable to make the length 64 feet for a larger dairy herd, and also lessen the number of horse stalls.

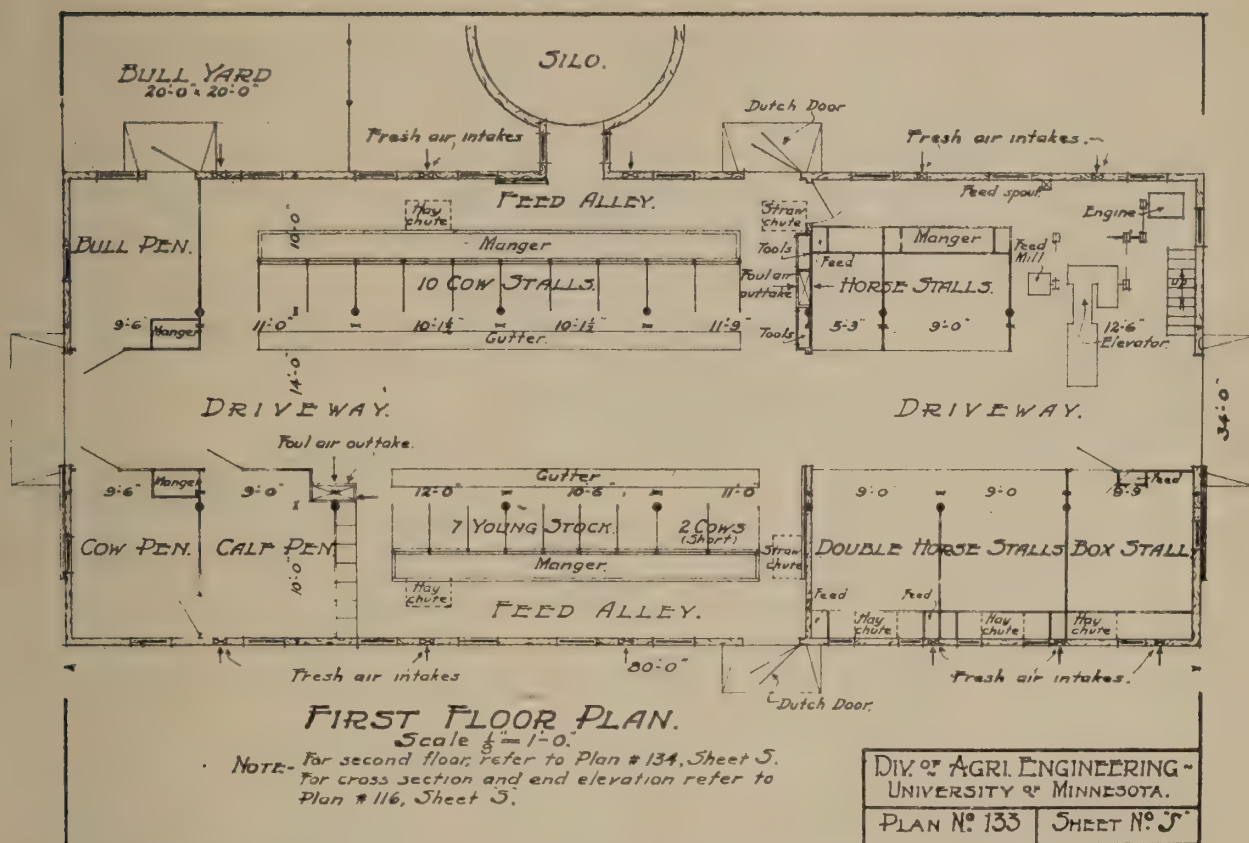
A general purpose barn 34x60 feet is shown in plan No. 118. It shelters 5 horses, 14 cows and has a box stall, a cow pen and a calf pen. The stalls are 3 feet, 4 inches wide for the cows which is as small as should be allowed. On one side the horse manger is at the outside wall while on the other there is a feed alley. The driveway is



Plan 118. General purpose barn, 34x60.



Plan 174. General purpose barn, 36x76.



Plan 133. General purpose barn, 34x80.

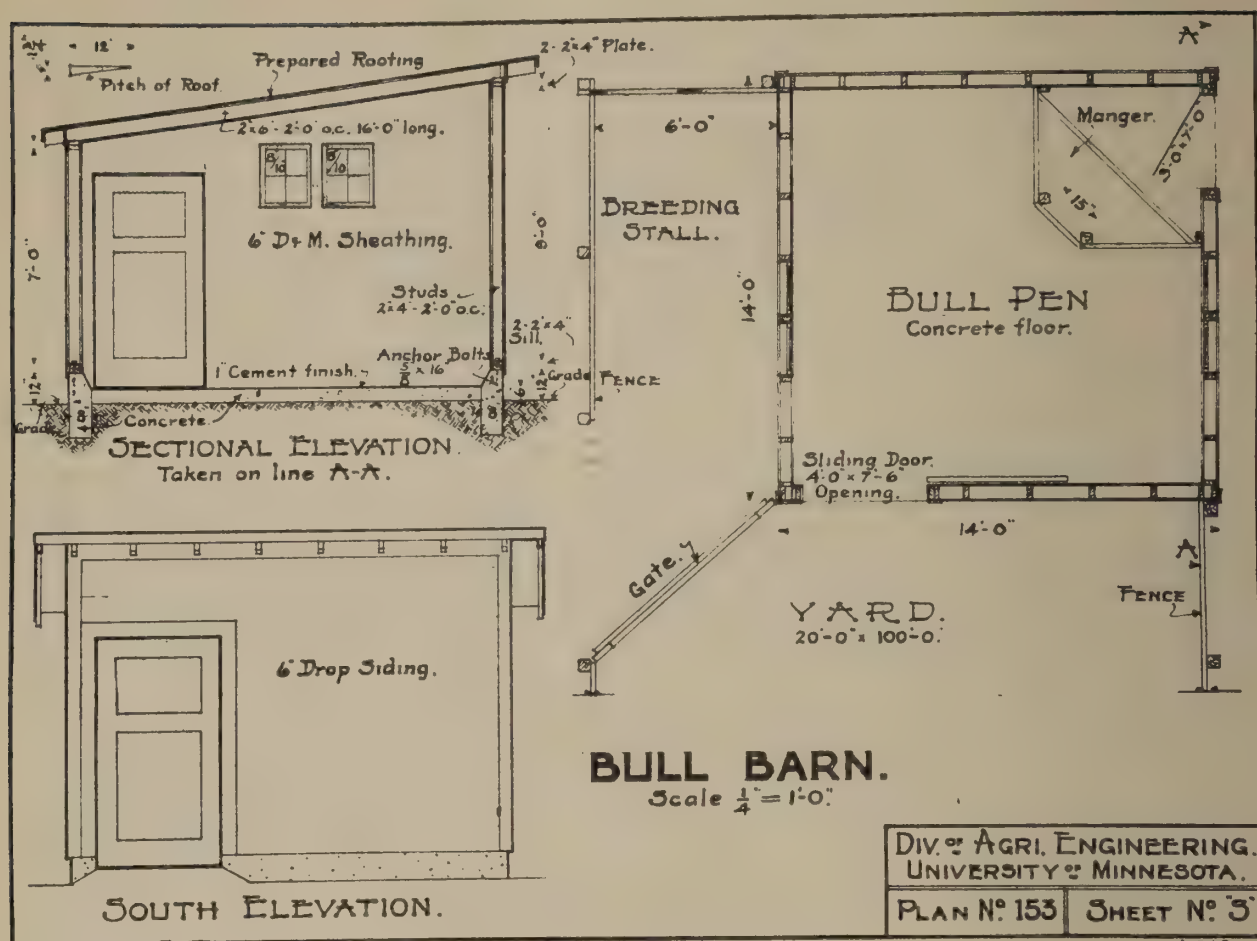
wide enough for a wagon or narrow manure spreader.

A barn 36x76 feet is larger than required on many farms and should be kept well filled with stock and warmly built or it will be cold under Minnesota conditions. The one shown in plan No. 174 shelters 5 horses and 14 cows and has 1 box stall, 1 cow pen, 1 calf pen and 1 bull pen. The stock face out and the driveway is large enough to permit driving through with a spreader. Hinged doors in addition to sliding doors are arranged to secure additional protection in severe weather. These doors may be removed in summer. In some cases the silo should be on the opposite side of the barn and milk house located where silo now stands.

A barn a little out of the ordinary is shown in plan No. 133. It is 34x80 feet and shelters seven horses, 12

cows and 7 head of young stock. There is a box stall, a cow pen, calf pen, and a bull pen. The bull has access to a yard through a door in the barn at his pen. The silo may be located at the cross alley and be a little more convenient for feeding the ensilage by means of a feed carrier. The layout of the yards would need to be considered in choosing the site, however. The outtake flues are located one on each side of middle so that they pass directly upward and if one is retarded by the wind blowing over the ridge the other will be accelerated.

On a number of farms there is no room in the barn for the bull and where a group of farmers own one together it is desirable to erect suitable shelter. A small barn or stable fourteen feet square is shown in plan No. 153. It should be strongly built or it will soon be damaged by the



Plan 153. Bull barn, 14x14.

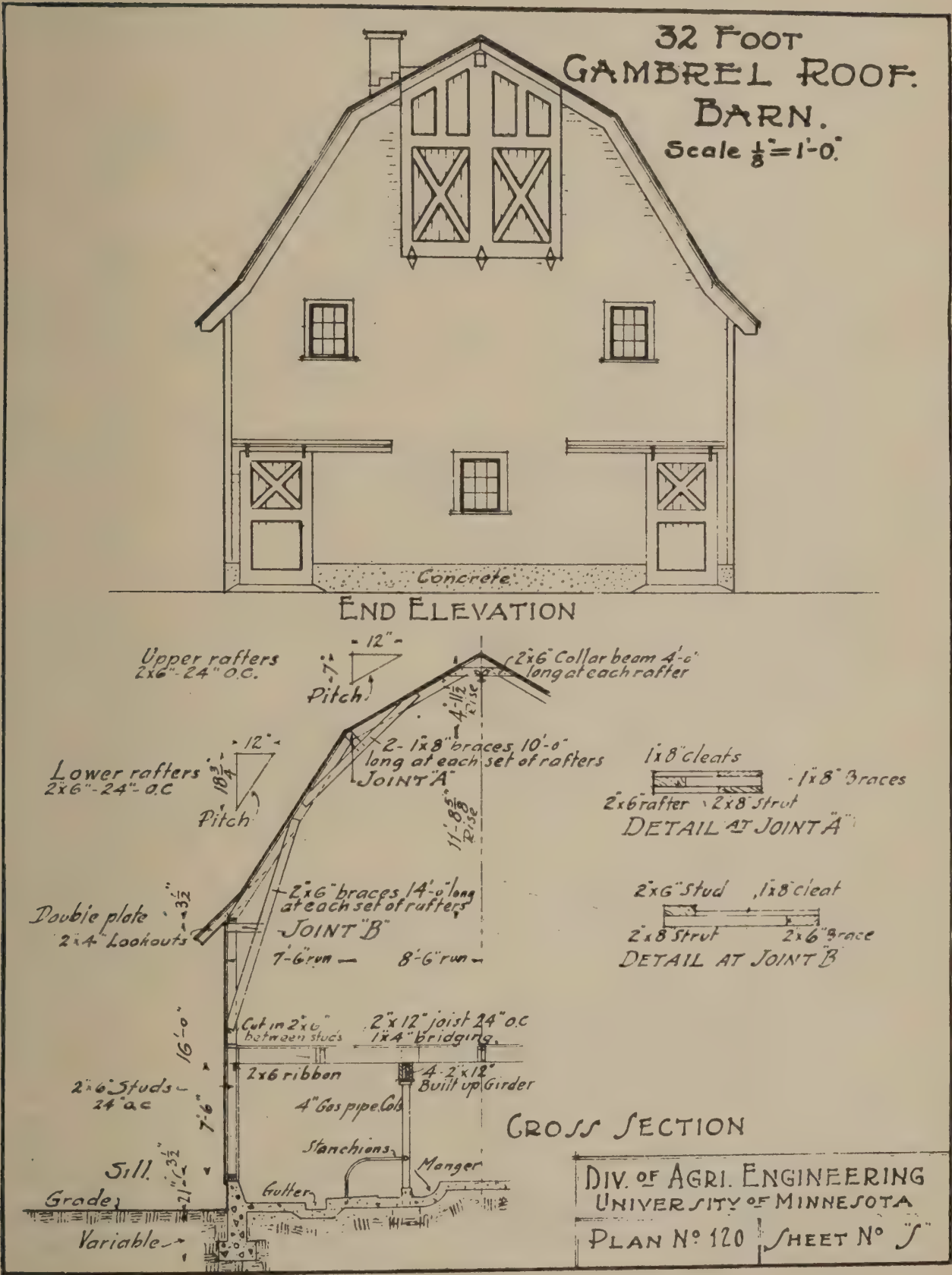
severe abuse it receives. The door slides inside to give it greater strength when closed.

The end elevation and cross section of a 32 foot gambrel roof is shown in plan No. 120. The cows face in and an elevated feed alley is shown. It is considered very convenient by farmers using it. The size of sills, studs, rafters, and braces are shown. The slope of the rafters is shown by the diagrams showing the rise of the rafter for one foot to run. A carpenter familiar with farm building construction can readily frame the roof by use of the framing square as the length of lower and upper rafter is readily obtained in laying out the proper cuts. Fourteen foot material is used for the lower rafters and 10 foot for the upper. It makes a stronger roof to have the upper and lower

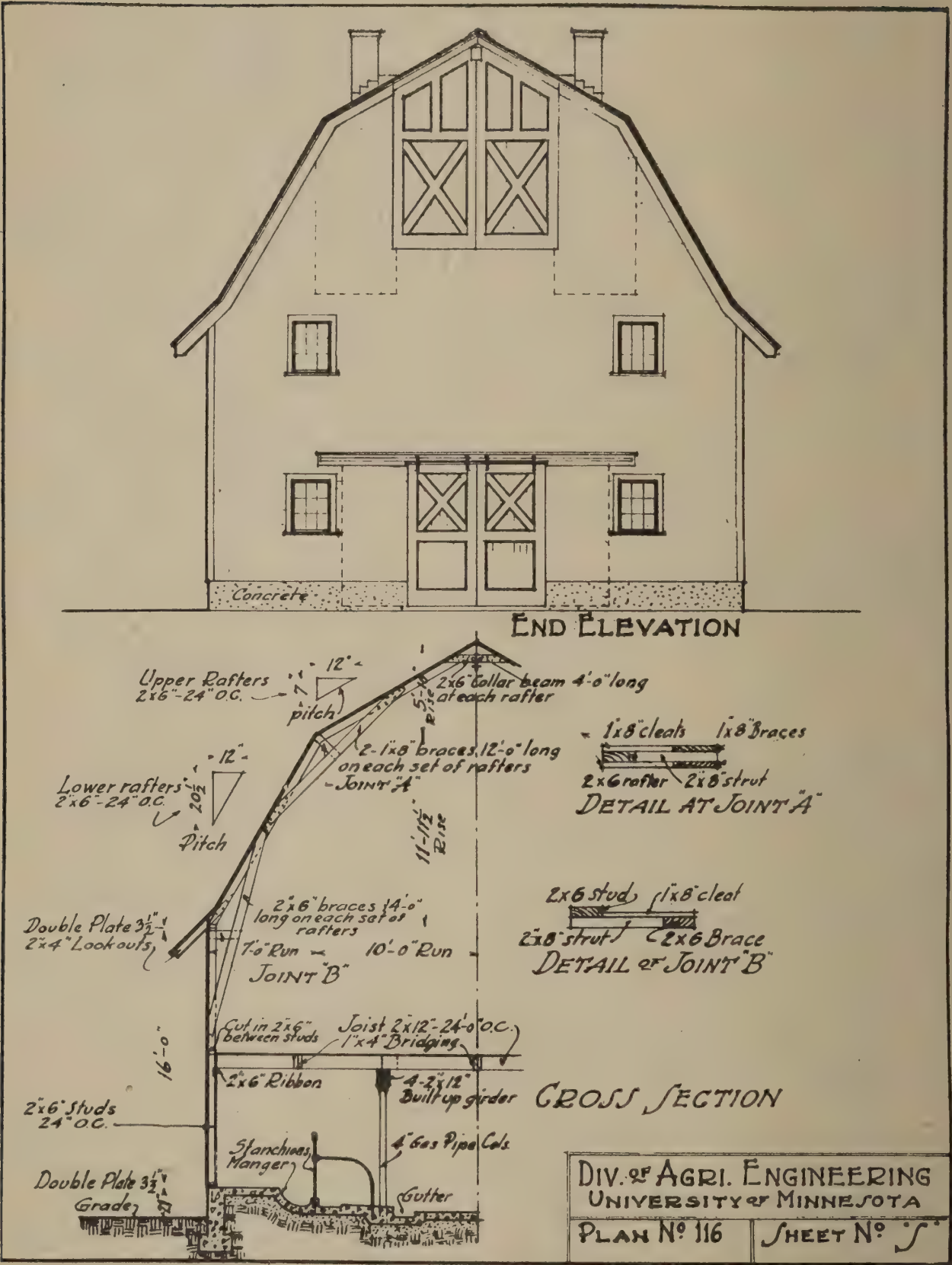
rafter braces meet with a good tight joint on the lower rafter.

The gothic roof barn 34 feet wide is very popular in many localities and in many cases carpenters have not used sufficient care to make it strong enough and the ridge has sagged and the roof become unshapely. Bolts $\frac{3}{8}$ inch in diameter and spaced about seven feet apart will hold the 7 ply rafters in shape and insure them against losing their proper curve.

A manger that is very well liked by many dairymen is shown in plan No. 121. It is very easy to push the roughage back into the manger and thus keep the alley clean. The slight depression at the front of the stall helps to retain the bedding and keeps it from sliding back toward the gutter. The gutter shown is one of the most satisfactory now in use. The measure-

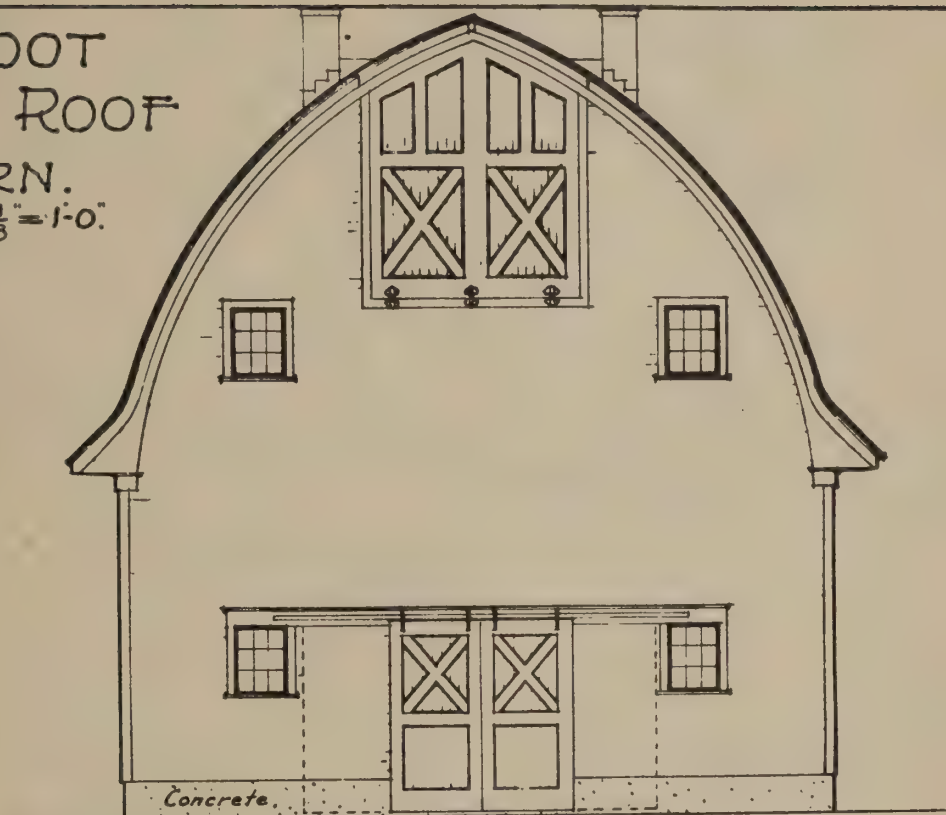


Plan 120. 32 foot gambrel roof barn.



Plan 116. 34 foot gambrel roof barn.

34 FOOT
GOTHIC ROOF
BARN.
Scale $\frac{1}{8}" = 1'-0"$



END ELEVATION.

Roofing

← Roof Boards.

SECTION OF RAFTER

Built up of 7 pieces of 1x3 bent to curve, nailed flatwise with 10 penny cement coated box nails every 4 inches (staggered).

Built up rafters set 2'-0" a.c. See section

2x6 collar beam 6'-0" long at each rafter.

2x6 rafters 2'-0" o.c.

1x6 lookouts 2'-0" o.c.

Double plate

1x8 brace 10'-0" long on each rafter.
2x12 brace 10'-0" a.c.

Radius 25'-8"

Radius 25'-8"

Cut in 2x6 between studs

Joist 2x12-2'-0" o.c.
1x4 Bridging

2x6 Ribbon

4-2x12 Built up girder

4 Gas pipe columns

2x6 Studs 2'-0" o.c.

Sill Grade Variable

Stanchions Manger

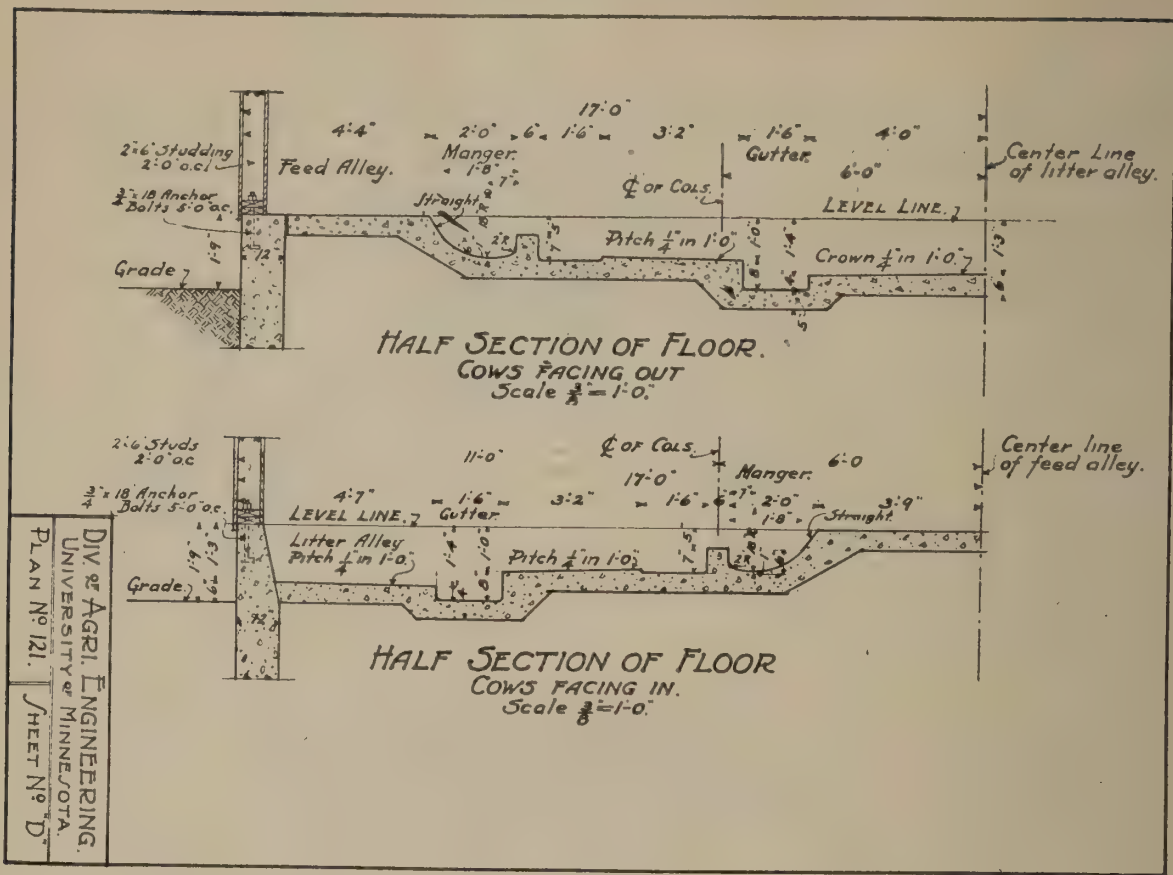
Gutter

CROSS SECTION.

DIV. OF AGRI. ENGINEERING.
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PLAN N° 139. SHEET N° 5

Plan 139. 34 foot gothic roof barn.

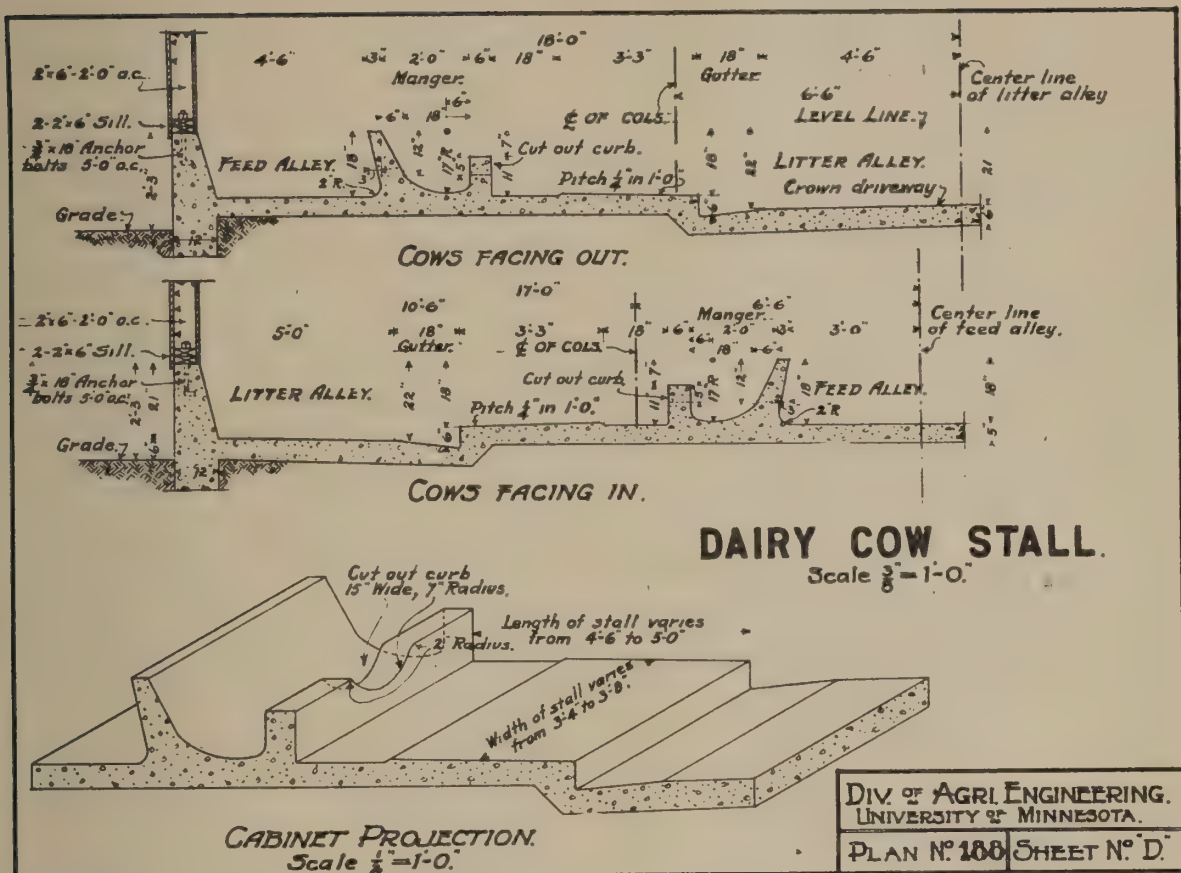


Plan 121. Half section of cow barn floor.

ments are shown of the different details for the stalls with the cows facing out or with them facing in.

Facing in has the advantages of one feed alley, better light for milking and keeping gutter sanitary and two entrance doors. The facing out has the advantages of one litter alley, which may be driven through, easier to operate milking machine, more sanitary

mangers, better display of animals and one entrance door for the herd. The dairy cow stalls in plan No. 188 show the measurements for a stall in a 36 foot barn with the cows facing out and also a stall in a 34 foot barn with the cows facing in. The range of measurements for width and length is also shown.



Plan 188. Dairy cow stall and floor section.



Typical Minnesota Dairy Barn.

MILK AND ITS USES IN THE HOME

Extracts from Farmers' Bulletin No. 1359 of the U. S. Department of Agriculture

Milk and cream together, either by themselves or in combination with other foodstuffs, make up about one-sixth by weight of all the food eaten by the average American family. Milk supplies in particularly convenient and usable form materials that children need if they are to develop strong, normal bodies; and it is a valuable food for adults, especially when it is combined with such foods as cereals and green vegetables.

Composition and Food Value of Milk

The milk ordinarily sold for household use varies in composition, principally because of differences between the breeds of cows and individuals of the same breed. On the average, however, milk contains 87 per cent water and 13 per cent solids, consisting of proteins, fat, sugar, and a variety of mineral substances. Because of the natural variation, most creameries now test all the milk they buy and pay for it on the basis of fat content. For the same reason dairymen who supply the retail trade usually find it best to mix the milk from a herd of cows immediately after it is drawn. In this way the content of the milk is kept more uniform from day to day, which is a decided advantage to the consumer.

Unprincipled producers or dealers sometimes adulterate their milk, greatly changing its composition. Legislation and Federal, State and municipal inspection, however, are making it more and more difficult to defraud the consumer in this way. The chief methods of adulteration are the addition of water, the removal of part of the fat, and the use of chemical preservatives, the first two of these methods often being used together. These practices not only are fraudulent as regards money value, but they also diminish the food value.

Milk is slightly heavier than water, its specific gravity varying with the proportion of water, fat, and other substances. The specific gravity of milk is sometimes used as a test of its purity, but since removing part of the fat raises and adding water lowers the specific gravity, one form of adulteration may cover up the other and thus render this test alone unreliable.

As a rule milk freezes at about 29 to 31 degrees F. The freezing point, however, varies with the composition, falling as the amount of solids becomes greater and rising as water is added. The freezing-point method is one of the most reliable for detecting the addition of water to milk.

The commission on milk standards of the New York milk committee, appointed to study and recommend uniform requirements among the different States and cities of the United States, has recommended the general adoption of the standard calling for not less than 3.25 per cent of milk fat and not less than 8.5 per cent of milk solids not fat. If all milk sold could be tested by such a standard, and the price regulated by the way in which the milk conforms to the standard, both producer and consumer would be better satisfied, the producer because he would get credit for rich milk, and the consumer because he would know what he was really buying. Such graded milk is sold in some European cities, and to a less extent in this country. The principle has been more commonly applied to cream, of which different grades are sold at prices varying with the proportion of fat. In addition to standards of chemical composition, many communities have adopted sanitary or bacteriological standards, and the milk is graded according to its purity.

Just what each of the nutrients as well as the vitamins contribute to the high food value of milk is discussed below in detail. Briefly stated, milk is an extremely valuable food because it contains, first, materials that children need for growth; second, materials that young and old alike need for the repair of their body machinery; and third, materials that all need for fuel, to provide them with heat and with the energy necessary for work. This does not mean, however, that milk has these ingredients in such proportions that it can serve satisfactorily as the only food of a grown person or even of a child. Since it contains such a high percentage of water, 5 or 6 quarts each day would be required to meet the needs of an adult if milk were his only food, and in this case unnecessary quantities of protein would be consumed. Also, grown persons and children past the normal nursing period need iron in greater abundance than is found in milk. The iron stored in the body of a new-born child is enough to enable it to live for a few months on that in milk, but older children and adults need more generous supplies, such as can be obtained from egg yolk, meat, whole cereals, and some fruits and vegetables. Furthermore, the digestive organs of healthy persons past babyhood do their best work when at least part of the food contains cellulose or roughage, such as is found in vegetable foods. When combined with other foods, therefore, milk is used to best advantage, and in the diet of the growing child it is exceptionally important. Child specialists declare that each child should take at least a pint of milk each day, and most such authorities recommend a quart a day.

Protein Compounds

Protein compounds are necessary for the formation of body tissues and fluids and may also serve as body fuel. Pro-

tein in food takes different forms. For example, the protein of the white of egg consists largely of albumin, lean meat contains a protein compound known as myosin, and peas and beans contain one called legumin. The principal protein compound in milk is casein. Another important one is called lactalbumin, but this is present in much smaller quantities. All forms of protein contain nitrogen and all are made up of substances known as amino acids. The combination of amino acids found in the proteins of milk, eggs, meat, and other flesh foods is very like some of those in the human body. These are therefore of special value for tissue building, and are called adequate, or complete, proteins, and milk and the other materials that furnish them are sometimes grouped together as efficient-protein foods.

Fat

Fats are the most concentrated fuel foods in the diet, and from the commercial standpoint fat is the most important substance in milk, since it is the source of butter and is an important constituent of many kinds of cheese. The fat of milk, known also as butter fat, is in the form of small globules varying in size in the different kinds of milk, and, being lighter than water, these globules tend to rise to the top of the milk as it stands, thus forming cream. Cream is not pure milk fat, but contains also some of the other substances in milk.

Milk Sugar

Milk sugar, or lactose, belongs to the group of nutrients called carbohydrates. Like cane sugar, it supplies energy to the body, but dissolves less readily and is much less sweet. Most of the milk sugar remains in the whey when the curd (casein) is removed in cheese making, and may be easily separated from it. Milk sugar is usually marketed as a fine white powder that looks like con-

fectioner's sugar, and is used in modifying milk for babies, in the preparation of drugs, and in many other ways.

Mineral Matter

Mineral constituents of milk that are especially important to the body are phosphorus, iron, and lime. Phosphorus is fairly abundant in milk. Although not much iron is present in milk, what little there is can be easily used by the body. Milk is much richer in lime, the chief constituents of bones and teeth, than are most other foods, and this is one of the reasons why it is an excellent food for children.

Vitamins

Vitamins are among the comparatively recent discoveries of science. Little is known about them or the part they play in the diet save that there are several kinds that are necessary for normal health and growth and that when they are left out of the diet for a long time so-called "deficiency diseases" develop. At least three kinds of vitamins are now recognized, which, until more satisfactory names are agreed upon, may be known as A, B, and C. All three of these vitamins may be present in milk.

Vitamin A is found only in certain foods, and in few so abundantly as in milk, especially from cows on pasture. This vitamin seems to be largely associated with the fat of the milk; therefore whole milk, cream, and butter are richer in this respect than are skim milk, buttermilk, and other milk products containing little fat. Other important sources of vitamin A are green-leaf vegetables, egg yolk, and the liver and other glandular organs of animals.

Vitamin B is found in many fresh foods, but not in highly refined ones such as white flour, cornstarch, polished rice, white sugar, and table oils. It is

present in milk but not so abundantly as is vitamin A.

Vitamin C is less widely distributed and seems to lose its special value more easily than A and B. It is furnished by certain fruits and vegetables—for example, oranges and tomatoes—and to some extent by milk. Its value in milk, however, seems to be easily destroyed so that absolutely fresh, uncooked milk from pasture-fed cows is the only milk that should be relied on to supply it.

Digestion of Milk

How easily and completely milk is digested depends upon the proportions of nutrients that the average normal person can assimilate. Since milk contains some of all classes of nutrients, the way in which it is digested can be better understood by following the changes in each nutrient separately.

Milk is commonly classed as a liquid food, and so it is until it reaches the stomach. There the rennin of the gastric juice converts the casein into a curd in much the same way that milk is separated into curds and whey in cheese making. The acid and the pepsin of the gastric juice, together working on the curd, make a small part of it more soluble, but most of the casein is digested in the small intestine. Lime water or barley water is sometimes added to milk for infants and invalids to prevent the formation of a tough curd, which may make digestion more difficult.

The fat of milk is also digested in the intestines and in the case of normal adults more easily than most other fats.¹ This is partly because milk fat has a low melting point, a fact that is believed to have important bearing on digestion of fats, and partly because it can be readily emulsified, or divided into particles that pass without difficulty through the walls of the intestines. For these

¹ U. S. Dept. Agr., Dept. Bul. 310, Digestibility of some animal fats.

reasons milk fat is considered especially suitable for invalids and children, but like any other fat may cause digestive disturbance if taken in too large quantities.

It is commonly supposed that the lactic acid of sour milk is changed to simpler bodies in the digestive tract. Its presence may be beneficial in checking the growth of bacteria that cause some kinds of intestinal disorders.

On the whole, milk is as well or even more thoroughly digested than other animal foods. When milk is the only food eaten by a healthy adult, decidedly less of its nutrients are digested than is the case when it forms a part of a mixed diet. Taking other food with the milk hinders the formation of lumps, or curd, of casein in the stomach and so makes the milk easier to digest. Of course, very young children digest mothers' milk alone better than any other food, because such milk is thoroughly adapted to their use. If other milk is substituted for mothers' milk, for best results it must usually be modified. For many adults in poor health, milk is an important food, and many persons whose digestive organs are not in good condition receive more benefit from it than from any other single food.

Effect of Cooking

Cooking affects the digestibility and food value of milk in some respects, changes the appearance and flavor slightly, and also destroys bacteria.

The curd of boiled milk is finer and more easily acted on by the digestive organs than that of either raw or pasteurized milk, though it is commonly said to be more constipating. The fat globules also are somewhat altered, and cooked milk fat may be slightly less easily emulsified than the raw. The food value of the sugar in milk is not changed by ordinary cooking.

Vitamin C is very easily affected by cooking, in fact, even by the ordinary aging of milk. When boiled or pasteurized milk or milk powder is used to feed infants, it is safer to give with it orange or tomato juice, and some physicians hold that this is a wise precaution even with raw milk. Vitamins A and B seem to be less easily affected by cooking.

The film, or "skin" composed of protein and fat, that forms on milk, especially when cooked in an open vessel, is the most noticeable change in appearance, unless the heat is intense enough to caramelize some of the sugar. In this case the milk becomes brownish in color. The peculiar odor and flavor of freshly boiled milk seem to be partly due to changes in the protein.

Milk for Infants

That the best food for an infant is milk from a strong, healthy woman is admitted by everyone. When this is not obtainable, the more nearly the substitute resembles it the better. Cow's milk is the most common substitute and when necessary may be artificially modified. Goat's milk, too, is in some cases recommended for infants.

Cow's milk contains more protein, less sugar, and slightly more fat than woman's milk, and the fat globules are larger. Also it is said to form a tougher curd.

Fortunately, most healthy babies thrive on good cow's milk or on cow's milk simply modified. It is the sickly who require special preparations, and their needs vary so greatly that only the physician familiar with the case, and not always he, can say what change is necessary. There are laboratories in many large cities and towns where modified milk of all sorts can be procured on prescription.

The milk for babies should be the purest obtainable, and should be cared for scrupulously after it is delivered. In

fact, it is usually more important that the milk for babies should be pure than that it should be especially rich, for the fat in very creamy milk may cause difficulty in digestion. Since raw milk may contain harmful bacteria, pasteurized milk is often considered safer for babies.

As a result of the demand for milk of unquestioned purity for children, certified milk may now be obtained in many towns and cities. This milk is produced and bottled under sanitary conditions, certified by a medical milk commission, and is labeled with a certificate that can be used only by establishments producing milk of a fixed standard of purity. Such milk justly commands a higher price than that of which the quality is not guaranteed. Certified milk should not be confused with so-called "sanitary" or "special" milk. These are terms applied somewhat loosely to milk produced and handled under conditions necessary to assure a pure, wholesome product, but they are sometimes applied by dealers, for purposes of advertising, to milk produced under decidedly insanitary conditions.

Bacteria in Milk

Besides the chemical compounds, milk contains minute forms of life called bacteria, which enter it from many sources during milking and handling.

The most common types of bacteria in milk are those that cause it to sour by converting the milk sugar into lactic acid, and are of special importance in the making of butter and cheese. Others, as they develop, change the color of milk or make it slimy or ropy. Still others, though they seem to have no effect on the milk itself, may spread disease. The milk from tuberculous cows, for instance, is unsafe, because it may contain the bacteria causing tuberculosis. Typhoid fever and diphtheria may be transmitted through milk in-

fectected by bacteria-laden flies, by unclean utensils, or by persons who carry such bacteria in their bodies or on their clothing. Epidemics have sometimes been traced to the milk from a single farm.

Milk is an ideal food for bacteria, and they multiply rapidly when the temperature is favorable. Most bacteria, however, are very sensitive to heat and cold, a fact of great practical importance in handling and marketing milk. Cooling milk to 50 degrees F., immediately after it is drawn from the cows, is an effective way to check the growth of bacteria, and pasteurization is the most satisfactory method of destroying them by heat, without producing undesirable changes in the milk itself. Though disease-producing bacteria in milk are destroyed by this process, some other kinds survive; therefore pasteurized as well as raw milk should be kept cold until used to check any further development.

Pasteurization of Milk

Though slight warmth is favorable to the growth of bacteria, long continued and intense heat is fatal to them. Unfortunately, heat sufficient to destroy all varieties of bacteria also causes changes in the chemical composition and flavor of milk, as in boiled milk; otherwise cooking would be a simple and satisfactory way of preserving milk. Pasteurization is a common method of applying heat so as to destroy as many bacteria as possible without producing undesirable changes in the milk. Many cities now require that all except certified milk be pasteurized before sale.

In pasteurizing, milk is generally heated to 145 degrees F., held at this temperature for 30 minutes, and then rapidly cooled. This treatment does not make the milk entirely free from bacteria, though when done by the best commercial method it destroys a large

proportion of the bacteria present and delays souring. While efficient pasteurization destroys disease germs, such as those of tuberculosis, diphtheria, and typhoid fever, it is not an insurance against future contamination, and as great care should be taken of pasteurized as of unpasteurized milk.

How to Pasteurize Milk at Home

Milk and cream for ordinary use or milk for feeding infants may be successfully pasteurized at home. The process is not difficult and requires only simple equipment. A pail somewhat deeper than the bottles containing the milk and with a perforated false bottom is perhaps the most convenient utensil in which to heat the milk. An inverted pie tin with a few holes punched in it serves very well as the false bottom, its purpose being to raise the bottles from the bottom of the pail, allowing free circulation of water and preventing the bottles from bumping. A good thermometer with the scale etched on the glass is needed. The ordinary floating dairy thermometer is likely to be inaccurate.

For general use, milk is most conveniently pasteurized in the bottles in which it has been delivered. Pour out a little of the milk, replace the covers, punch a hole through the cap of one of the bottles, and insert the thermometer. Set the bottles of milk in a pail, fill with cold water nearly to the level of the milk, and heat the contents until the thermometer in the milk registers 145 degrees F. Remove the pail from the heat and allow the bottles to remain in the water for 30 minutes, reheating if necessary to keep the temperature at 145 degrees F. After the 30 minute period, replace the hot water gradually with cold until the temperature of the milk is down to 50 degrees F. If necessary, use ice in the water to bring the milk to this temperature. After cooling, put the

bottles in the refrigerator and keep them at 50 degrees F. or less.

Milk for infants is best pasteurized in the nursing bottles in the quantity needed for each feeding. It is then in the most convenient form to use, and there is no possibility of contamination by pouring it into other bottles. It is customary to pasteurize enough at a time to last for 24 hours. Milk in these smaller bottles is pasteurized by a slightly different method from that used when it is in ordinary bottles. A wire or tin basket that holds the bottles upright in the hot-water bath and makes it possible to handle them all at one time and without scalding the fingers is a great convenience.

Pour into each bottle the exact quantity of milk required for a feeding, after modifying it, if necessary, according to directions. It is wise to prepare an extra bottle, for there is always the possibility that one may be broken during pasteurization. Put the seals in place or plug the tops of the bottles with clean ordinary (not absorbent) cotton, and insert the thermometer in one of them. Place the bottles in the wire basket, set it in the pail, fill the pail with water nearly to the level of the milk, and heat until the thermometer in the milk registers 145 degrees F. Remove the bottles, change the thermometer from the milk to the water, and add cold water until the temperature of the water is also 145 degrees F. Put the bottles back into the water, cover with heavy cloth, and let stand for at least 30 minutes. Then cool the bottles as much as possible by running cold water into the pail, and store them in the refrigerator, or, still better, pack broken ice about them before putting them in the refrigerator. Remove the milk from the refrigerator, bottle by bottle, as needed. If a bottle is warmed, and not used, discard it; do not return it to the refrigerator to be used for a later feeding.

Care of Milk in the Home

No matter how well milk has been handled up to the time it is delivered to the consumer, it can not be expected to keep well if it is then carelessly treated. Milk should be kept clean, covered, and cool; these three points consumer as well as producer should never disregard.

The best way of buying milk is in bottles. In this form it can be kept clean and cool more easily during delivery and is much more convenient to handle. Dipping milk from large cans and pouring it into customers' receptacles on the street exposes it to dusty air and is bad practice. Drawing milk from the faucet of a retailer's can is not quite so bad as dipping, but the milk is not kept thoroughly mixed and some consumers will receive less than their share of cream. By whichever of these methods the milk is measured, it should be delivered personally to some member of the household, if possible, or a covered vessel may be set out, such as a bowl covered with a plate, or better still, a glass jar, used for no other purpose, with a glass lid but without a rubber ring. Under no circumstances should an uncovered vessel be set out to collect thousands of bacteria from street dust before the milk is poured into it. Money and paper tickets are generally more or less soiled; hence neither should be put into the milk receptacle.

Sometimes milk delivered as early as 4 a.m. remains out-of-doors in a place exposed to sunshine and perhaps accessible to cats and dogs until after 9 or 10 o'clock. This is wrong. If the milk can not conveniently be brought into the house at once, the delivery man should be asked to leave it in a sheltered place or in a covered box provided for the purpose. Even a temporary rise in the temperature of milk will help the development of bacteria that have been held in check by keeping the milk cool.

As soon as possible after delivery,

milk should be put in a cool, clean place and kept there until used. Exposure to the air of pantry, kitchen, or nursery is harmful. Unless it is in the bottle into which it was put in the dairy, the milk should be poured into a freshly scalded vessel and covered.

The best temperature for keeping milk is 50 degrees F. or less, and good milk kept as cool as that should remain sweet for 12 hours at least and ordinarily 24 hours or more, after it reaches the consumer. If ice can not be obtained, an iceless refrigerator or some such device is a help, even though a temperature as low as 50 degrees F. can rarely be maintained in it.

In the ordinary refrigerator, unless the milk container is in actual contact with the ice, the milk will be colder at the bottom of the refrigerator than in the ice compartment, for cold air settles rapidly. The refrigerator should be kept clean and sweet at all times. It is a good plan to inspect it thoroughly at least once a week to see that the outlet for water from the melting ice is open and that the space under the ice rack is clean. Also, the food compartments should be washed often with water to which washing soda has been added, for particles of food dropped in the refrigerator are likely to spoil and to contaminate other foods.

Sometimes in very hot weather housekeepers complain that, in spite of all precautions, milk sours quickly, even in the refrigerator. This is often due to the fact that the air of the refrigerator, although cool in contrast with the heat outside, is really not cold enough to check the growth of the bacteria in the milk. If a thermometer placed inside registers more than 50 degrees F., the fault can not be laid entirely to the quality of the milk.

Milk should be kept covered to exclude not only dirt and bacteria, but also flavors and odors, which it readily ab-

sorbs. It should be kept away from such foods as onions, cabbage, or fish.

Bottled milk should be kept in the bottle in which it is delivered until needed for use. In fact, from a sanitary standpoint, serving milk on the table in the original bottle is an excellent practice. In any case a milk bottle, especially the mouth, should be cleaned carefully before the milk is poured from it, and only what is needed for immediate use should be poured out at a time. The bottle should be kept covered with a paper cap or an inverted tumbler as long as there is milk in it.

New milk should never be mixed with old unless it is to be used at once; the old milk is likely to contain a larger proportion of bacteria and to be warmer. Some persons even go so far as to say that milk or cream that has been exposed to the air by being poured into other vessels for table or cooking use should not be poured back into the general supply.

Milk Products

The average composition of various milk products, as compared with that of whole milk, is shown in the following table:

Average Composition of Milk and Milk Products

Product	Water.	Protein	Fat.	Carbohy- drates.	Mineral Matter.	Fuel value per pound.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Calories.
Whole milk	87.0	3.3	4.0	5.0	0.7	315
Skim milk	90.5	3.4	.1	5.1	.7	165
Cream	74.0	2.5	18.5	4.5	.5	880
Buttermilk	91.0	3.5	.5	4.2	.8	160
Whey	93.4	.8	.3	4.8	.7	115
Condensed milk, sweetened..	28.0	7.8	9.0	53.5	1.7	1,480
Condensed milk, unsweetened	73.0	7.0	8.0	10.5	1.5	645
Skim-milk powder	4.0	35.0	2.0	51.0	8.0	1,640
Whole-milk powder	4.0	1.0	29.0	36.0	5.5	2,300
Butter	13.0	25.5	83.0	....	3.0	3,410
Cheese (American, cheddar)..	33.5	26.0	35.5	1.5	3.5	1,950
Cheese (Swiss)	31.4	27.6	34.9	1.3	4.8	1,950
Cottage cheese (skim milk)..	69.8	23.3	1.0	4.0	1.9	535
Kephir	89.6	3.1	2.0	4.5	.8	220
Koumiss	90.7	2.2	2.1	4.1	.9	200

Skim Milk

Although skim milk contains much less fat than whole milk and therefore is not so rich in flavor, it has as large or larger proportion of protein, carbohydrate, and ash. Even after most of the fat is removed from average milk, the remaining solids make up nearly one-tenth of its weight. Moreover, in the ordinary mixed diet enough fat is supplied by meat, butter, lard, and in various other forms, so that the loss of this ingredient is of relatively little importance. Protein, on the other hand, is the most costly of the nutrients and the one

most likely to be lacking in inexpensive meals, and skim milk supplies this in a cheap and useful form. Skim milk, therefore, may greatly increase the nutritive value of the diet if freely used in cooking or as a beverage in case the supply of whole milk is limited.

Condensed and Evaporated Milk

When milk is heated the water in it is readily driven off, and if the heating is continued long enough, the milk becomes thick and creamy. Advantage is taken of this fact in the manufacture of condensed and evaporated milk. On a commercial scale the process is commonly

carried on in vacuum pans, as under such conditions a lower degree of heat may be employed and the danger of scorching is lessened.

Commercial sweetened condensed milk is usually made by adding cane sugar to fresh milk, heating the milk to dissolve the sugar, and then evaporating the whole until its bulk is about one-third that of fresh milk. The low water content and the large proportion of sugar do not favor bacterial growth; therefore, condensed milk will keep for a fairly long time after the can is opened.

Evaporated milk, as known in the trade, is whole milk that has been condensed in a vacuum pan to about one-half of its original volume without the addition of sugar. After it is drawn from the vacuum pan, it is put through a homogenizer to break up the fat globules, so that they will not separate on standing. The milk is then placed in sealed cans and exposed to steam under pressure. The temperature must be sufficiently high and the exposure long enough to destroy all bacteria in the milk. In this process a soft curd is usually formed, and after the milk has cooled the cans are shaken vigorously to break up this curd and give the milk a creamy consistency. If properly made, evaporated milk contains no bacteria and unopened will keep indefinitely. After opening it must be handled carefully, for like fresh milk it is liable to become contaminated with bacteria.

Both condensed and evaporated milk may be used in cookery and in many other ways like fresh milk, and they are particularly convenient in situations where fresh milk can not be obtained or is limited in supply. The comparatively small bulk is also an advantage in shipping.

Dried Milk or Milk Powder

Dried milk is the solids of milk from which practically all the water has been

removed. It is, in fact, the most concentrated form in which milk is now marketed, and hence is convenient for storage and shipment. One hundred pounds of fresh milk, it is estimated, can be reduced to about 12½ pounds of fine powder or flakes containing all the protein, fat, sugar, and minerals of the liquid milk. Because of the tendency of milk fat to become rancid, at least part of it is often removed before milk is put through the drying process, but dried whole milk is now being successfully produced and distributed. Though the skim milk powder has the advantage in keeping quality, dried whole milk has about 40 per cent higher fuel value because of the fat. Under the Federal Food and Drugs Act, dried whole milk must contain not less than 26 per cent milk fat, and not more than 5 per cent moisture.

Dried milk mixed with the right proportion of water looks and in some cases tastes very much like fresh milk, though the flavor depends to a great extent on the method of manufacture and the age of the powder. In food value, also, dried milk restored to liquid form compares favorably with fresh milk, except perhaps in vitamin content. According to experimental data published by the United States Public Health Service and other agencies, dried milk powders, like any other kind of heated milk, may lack vitamin C, and if used in feeding infants another food rich in this vitamin, such as orange or tomato juice, should be given as a safeguard. The skim milk powders are also deficient in vitamin A, because it has been largely removed with the fat. In general, dried milk, like the condensed and evaporated forms, is of greatest value where fresh milk is difficult or impossible to obtain.

Reconstituted Milk

Reconstituted, or reconstructed, milk, as it is sometimes called, is obtained by blending together the constituents of milk

previously separated. It is made from skim milk powder, sweet, unsalted butter, and pure fresh water, or from whole milk powder and water, or from evaporated or skim milk as a basis with any additional preparation of milk fat to give the desired richness. Sanitary precautions are just as necessary in handling reconstituted milk as if it were fresh. In situations where the transportation of so bulky and perishable a food as fresh milk is a problem, reconstituted milk may be a convenience and economy, since only the solids need be shipped.

Cream

Cream contains the same constituents as milk, the chief difference being that in cream the proportion of fat is greater. Though cream is often added to a soup, sauce, or dessert, chiefly to improve flavor and texture, it should be remembered that the food value of the dish is increased as well. Ordinarily cream is one of the most easily and thoroughly digested of the common fat foods, but like any other concentrated fat may cause disturbance if eaten in overlarge quantities.

The heat necessary in pasteurizing cream causes it to lose some of its body and sometimes to separate slightly; therefore in order to prevent these effects many dairies now homogenize their cream before pasteurizing. By this mechanical process the fat globules are made so fine that they show no tendency to rise to the surface, an advantage except in the case of cream for whipping. For this purpose raw cream, which has been neither pasteurized nor homogenized, has proved best.

Devonshire clotted cream, not so well known in the United States as it deserves to be, has a nutty flavor that combines especially well with fruits and various desserts. It is prepared as follows: Vessels of milk on which the cream has been allowed to rise undisturbed are

heated slowly and cooled, and the thick clotted cream is then skimmed off. This process not only develops a characteristic flavor but checks development of bacteria, so that clotted cream keeps better than ordinary cream.

Butter

Butter, or in other words milk fat in a very condensed form, is one of the most palatable and digestible fats in our diet. Moreover, it also has special food value because it contains vitamin A. The flavor, color, and texture of butter influence price to some extent, but affect quality rather than composition, and so far as is known have little effect on nutritive value or digestibility. They are also an index of care and cleanliness in making and handling butter.

Buttermilk

Strictly speaking, buttermilk, is the mildly acid liquid left after the fat globules of milk or cream have been churned into butter and removed. Buttermilk, however, is also manufactured by ripening pasteurized skim milk with lactic acid cultures and then so stirring the curd that it is broken up into fine particles, just as by churning. In fuel value buttermilk, whether a by-product of butter making or manufactured with cultures, is very similar to skim milk. The casein of buttermilk, however, is often more easily digested than that of ordinary milk, and for this reason carefully prepared buttermilk is sometimes a food of special value for babies and invalids. Though most often served as a beverage, buttermilk may be used in practically the same way as sour milk in cookery, and can also be made into ice cream.

Whey

Just as buttermilk represents what is left from cream in butter making, so whey represents what is left from milk in cheese making. Though less nutritious than buttermilk and skim milk, since it

contains less protein, whey may be substituted for them in making bread and other cooked foods, and it is also useful in some cases as a mild laxative drink for invalids.

Whey that differs little in composition from regular cheese whey, may be made at home by cooking sweet milk with some acid material, such as vinegar, lemon juice, or cream of tartar, or even with sour milk. Fresh curds and whey is an old-fashioned dish still used to some extent, though less common than it was when cheese making was regularly carried on in the home.

Sour Milk and Clabber

The lactic acid bacteria normally present in milk cause it to sour quickly if not held at a low temperature. As the milk curdles from the effect of the acid, it gradually becomes semi-liquid or "clabbered." Usually no special methods are followed in preparing clabber other than allowing the milk to stand undisturbed until it curdles. If the souring takes place too slowly, however, the clabber may have an unpleasant flavor due to the growth of undesirable bacteria. Sour milk and clabber are widely used in cookery, and, like sweet milk, add to the food value of many dishes.

Kephir, Koumiss, and Other Fermented-Milk Products

Since earliest times fermented-milk products, made from the milk of various animals, have been used as beverages and articles of diet in central Asia, Turkey, and other countries. These products are prepared by allowing special ferments or yeasts to develop in milk and the carbon dioxide produced makes the fermented milk effervescent. The flavor differs with the process of manufacture. Fermented-milk beverages may be made at home, but are perhaps more commonly commercial products in the United States.

These fermented-milk products contain

lactic-acid-forming bacteria in great abundance, and their extensive use has been much discussed, owing to the prominence given to the theory that many disorders, particularly those that come with old age, are the results of the development of certain bacteria in the intestine and that the growth of such organisms may be hindered by the presence of lactic acid. The most recent observations, however, make it doubtful whether such soured milk is as beneficial as has been claimed by some enthusiasts, though it has proved of value in invalid dietetics.

A carbonated milk, made by charging milk with carbon dioxide, is sometimes found on sale, but of course lacks the special qualities of the fermented-milk products.

Special Infant Foods

Of the many patent infant and invalid foods on the market, some consist of cow's milk combined with varying amounts of carbohydrates or other materials and others seem to be made of starchy materials without milk. In some cases the carbohydrates have apparently been malted before being combined with milk, or else malt extract is added during the process of manufacture.

Experience has shown that these special foods, when they contain nutrients of milk, are sometimes valuable for infants when it is necessary to resort to artificial feeding. Too much faith should not be put in the extravagant claims made for some brands of infant foods. The safest course is to follow the advice of a competent physician in selecting the substitute for natural feeding. It is often wiser to use cow's milk, modified at home under a physician's directions, rather than these commercial foods.

Use of Milk in Cooking

If freshly used in the preparation of other foods, milk can be made to add

greatly to the food value of the meals. A dish is, of course, richer if whole rather than skim milk is used, but the value of skim milk should not be overlooked, for it contains not only the protein but practically all the other nutrients of milk except the fat. The following suggestions apply to the use of either whole or skim milk.

Soups

Milk soups are an excellent way not only of serving milk but also of utilizing left-over portions of vegetables and other foods. In making these soups, allow to each cup of liquid (including milk and the juice and pulp of vegetables) about one-half tablespoon of flour and one tablespoon or more of butter or other fat. Some of the flavorings that may be used are onion, corn, asparagus, cabbage, cauliflower, peas, potatoes, beans, tomatoes, celery, spinach, salmon or other fish, or grated cheese.

Often children who do not like milk to drink will relish it when combined with a favorite vegetable and served as soup, and in this way may be induced to take the desired amount of milk each day. Moreover, there is peculiar fitness about thus combining milk with vegetables. Many vegetables are rich in iron and vitamin C, while milk does not furnish either of these abundantly.

The following method of making milk-vegetable soups so as to conserve mineral substances and vitamins is particularly desirable if the supply of green vegetables is limited. It is also a good way of making soup to be given to children, for although a watery soup is often appetizing, so small a portion as a child usually eats provides little nourishment. The raw vegetables are chopped fine and then cooked in little or no water just long enough to make them tender, and the milk and thickening are added. All the liquor is thus utilized without greatly diluting the milk, and the brief cooking tends to prevent destruction of vitamins.

Egg yolks added to milk-vegetable soups just before they are served make them still richer in protein, fat, iron, and vitamin A.

Chowders

Fish chowders are also an appetizing way of serving milk. The proportions are 2 cups of milk or of milk and water, 1 cup of potatoes cut into small pieces, 1 pound of fish, and 4 large crackers. Onions and fat from salt pork are usually added for flavor. These proportions make a rich dish, and good chowder can be made with less fish.

Other dishes that resemble chowders, and are often incorrectly so called, can be made by substituting for the fresh fish small portions of left-over fish, salt codfish, or dried beef. The so-called vegetable chowders have corn, lima beans, sliced carrots, or other vegetables in place of the fish.

Creamed Dishes and Gravies

The foundation of creamed dishes is white sauce made of milk, butter, flour, and seasonings. For a sauce of medium thickness the proportions are: 1 cup of milk, 2 tablespoons butter, and 2 tablespoons flour. These ingredients may be combined in several ways, but the following method is economical of time and utensils and yields a rich, smooth sauce. Blend the flour with the butter which has been melted but not allowed to brown, add the milk carefully, and stir the mixture constantly until it thickens and begins to boil. The sauce is then ready to combine with a cooked vegetable, such as cauliflower, diced potatoes, or celery, with hard-cooked eggs, or with chopped meat or fish. Adding grated cheese to the white sauce for many creamed dishes gives them richer flavor as well as greater food value. A rich cheese sauce of this kind poured over crisp toast makes a satisfactory lunch or supper dish, especially if served with a succulent vegetable.

Milk gravies are made in the same way as white sauce, except that drippings from bacon, chicken, ham, or other meat are substituted for the butter.

Beverages

Milk may be used as the basis of a great variety of hot and cold beverages that are about equal to milk itself in food value but are more pleasing in flavor to persons who do not like to drink plain milk. Moreover, children and others who need milk in large quantities enjoy having it served occasionally in unusual ways. The food value of these milk beverages depends, of course, on the kind as well as the proportion of both milk and flavoring used.

Chocolate and cocoa are probably the most popular flavorings for milk beverages, for they combine well with either whole or skimmed fresh milk or with the milk reconstituted from the dried, evaporated, or condensed products. Moreover, these chocolate-flavored milk beverages are good served either hot or ice cold, and they are easily and quickly made at home. For young children, cocoa is considered preferable to the stronger, richer chocolate.

Cafe au lait, which is merely hot milk flavored with a little very strong coffee, has greater food value than ordinary coffee and cream, and many persons prefer it as a breakfast beverage.

Vanilla, almond, and other household flavoring extracts, caramel or maple sirup, fruit juices and sirups, and some of the common spices, are also satisfactory flavorings if thoroughly blended with the milk.

Somewhat effervescent milk beverages of pleasing flavor may be made at home simply by adding to cold fresh milk small quantities of ice-cold ginger ale, sarsaparilla, or some of the other bottled soft drinks.

Eggnog, made by beating together milk, egg, and the desired flavoring, is

a particularly nutritious drink, since it combines two foods rich in protein and minerals.

The proportion of flavoring material to use in these milk beverages depends on individual taste, and definite proportions can be worked out by a few experiments. For children and invalids they should generally be flavored rather delicately. Shaking or beating milk drinks until they are frothy when served adds to their attractiveness.

Desserts

There is almost no end to the puddings and desserts in which a large quantity of milk may be used.

Junket is one of the simplest and most wholesome, for it is merely sweet milk thickened to custard-like consistency by means of a rennet preparation. Caramel, maple, and almond, as well as vanilla, are good flavorings for junket, or crushed fresh fruits or fruit sirups may be served with it for variety.

Sweet curd, made in the same way as junket, except that the thickened milk is broken up and strained, may be used as the basis for filling for pies and tarts. To the curd from 1 quart of milk, add 1 tablespoon of butter, $\frac{1}{4}$ cup of sugar, 2 egg yolks, a few dried currants or chopped raisins, and the desired spice.

Milk sherbets, frozen custards, and ice creams are all ways of serving milk and cream in a form that most persons find attractive and refreshing, particularly in hot weather. The food value of these frozen-milk desserts depends, of course, on the proportion of milk or cream to flavoring material, a fact that should not be overlooked, especially when they are served to children.

Many kinds of nutritious puddings may be made by slowly baking sweetened milk with a cereal, such as rice, corn meal, or buttered bread, and raisins or some other dried fruit or a spice for flavoring. Old-fashioned creamy rice pudding has

long been a favorite of this type, and is easily made by adding 1 tablespoon of rice and the desired seasoning to 1 quart of milk and baking the mixture slowly until it thickens to a creamy consistency and the rice grains are soft and several times their original size. These milk puddings may be served either hot or cold and with or without cream or a sauce. Hot Indian pudding served with ice cream is a favorite combination in New England.

There are also the custards, of which milk and eggs are the chief ingredients, and the Bavarian, Spanish, and other creams, which consist chiefly of milk or cream flavored in various ways and stiffened with gelatin. Many of these custards and creams, if carefully made, are especially suitable for children and invalids.

Blanc mange and cornstarch pudding are still other dishes made chiefly of milk. These too, may be varied indefinitely by the use of different flavorings or by serving them with sauces made of fresh or canned fruit.

Summary

Milk is one of the most important foods, in spite of the fact that it is about seven-eighths water. It excels almost all other foods in the variety and quality of materials that it furnishes the body, and is suitable for persons of all ages.

The solids of milk include protein, fat, sugar, and mineral matter, all in such form that they can easily be utilized in building and repairing the tissues and bones of the body. Milk is far richer in lime, for example, than other common foods, which makes it especially valuable for young children.

Fresh whole milk also may contain all three of the vitamins, constituents of certain foods found by scientists to be necessary for the maintenance of health and normal growth. Milk fat is fre-

quently the most readily available source of vitamin A, which children must have in order to grow and develop normally.

Milk is one of the easiest of all foods to digest for the normal healthy person and for many invalids as well.

Certified milk often recommended for children is a special grade produced in establishments rigidly inspected and vouched for by a medical milk commission, and must therefore conform to a high standard of purity.

Milk should be kept clean, covered, and cool in order to prevent the bacteria in it from developing and causing it to spoil.

Even milk that looks clean may contain germs of such diseases as typhoid fever, tuberculosis, and diphtheria, if drawn from diseased cows, if handled by persons carrying the germs of these diseases, if the utensils and containers are washed in polluted water, or if the milk is contaminated by flies.

Pasteurizing milk, or holding it at a temperature of 145 degrees F. for 30 minutes, is the best practical method of destroying disease-producing bacteria without causing undesirable changes in the milk. Milk for general use or for infant feeding can be successfully pasteurized at home, and this should be done if there is any question about its purity.

The consumer must share with those who produce and handle milk the responsibility of keeping it sweet and pure until used. It must be kept in a clean, cool place free from undesirable odors and put only in scrupulously clean vessels.

The care of the refrigerator plays an important part in the keeping quality of milk stored in it. It should be inspected at least once a week and thoroughly cleaned at regular intervals.

Skim milk, although lacking in fat, is a highly nutritious food, especially useful in cooking or combining with other

foods. It contains practically all the protein, sugar, and mineral matter of the whole milk.

Condensed, evaporated, and dried milk may be used for many purposes in place of fresh milk when the latter is not available. For feeding children, these preparations may not, however, entirely take the place of fresh milk, and should be

supplemented by fruit juices and fresh green vegetables.

The fat in cream and butter is very thoroughly and easily digested and carries with it relatively large amounts of vitamin A.

Soups, beverages, and desserts made chiefly of milk are appetizing ways of serving it, especially for persons who do not like to drink plain milk.



THE MILKY WAY

ICE CREAM MAKING ON THE FARM

C. D. DAHLE, UNIVERSITY FARM

Ice cream making in the home, especially in the farm home, is a simple and inexpensive process. The farm household is better adapted to making ice cream than the city home since the source of raw ingredients is at hand. If ice cream is to be had on the farm it is only logical to believe it should be made there, for the transportation of ice cream from town to the farm necessitates considerable care; otherwise the product may melt before it reaches the farm. The lack of an ice supply is a handicap on many farms, but in the farm home which has a supply of both ice and cream, ice cream should grace the table more often than it does.

A decade or two ago ice cream was considered a luxury or delicacy to be served in small amounts on rare occasions. Today this is not the case for ice cream is recognized as food—a good food and one that can be eaten by all, old or young, invalids not excluded.

With this change in viewpoint more ice cream is being eaten in the home, yet the amount consumed on the farm is far below that consumed in cities and towns. Instead of being a dish for hot summer days it is now considered as an all year food. For hot days an ice cream of low butter fat content or an ice or sherbet may be more desirable than one high in fat, while in the winter time a high fat ice cream such as a Mousse will be more appropriate. All or any of these may be made on the farm. Changing recipes occasionally keeps ice cream from becoming too common although in general it is not a common article in the farmer's diet.

Ice cream contains all the solid ingredients found in milk, and in larger amounts. In addition it contains gela-

tine (commercial ice cream) and a large amount of sugar. Ice cream made on the farm often contains eggs which add to the food value. This food supplies all of the necessary needs of the body and besides is a palatable, soothing and delicious dish.

Ice Cream Recipes

In selecting a recipe much depends upon the individual's taste. A plain ice cream made from sweet cream can be made as palatable as any one desires. Fancy ice cream may be made for special occasions but may not have enough more food nutrients to compensate for the cost of making.

Plain ice creams with vanilla flavor may be made from any of the following recipes. Ingredients enough for one gallon of ice cream are given.

No. I

2-2½ quarts of 20 per cent cream.

¾ pint sugar.

Vanilla to suit taste (usually 1 tablespoon.)

No. II

1½ quarts 20 per cent cream.

1 quart skim milk.

¾ pint sugar.

Vanilla to taste.

No. III

1-1½ quarts 20 per cent cream.

1½ pints whole milk.

½ pint condensed milk.

¾ pint sugar.

Vanilla to taste.

Any one of the above mixes should yield a gallon of ice cream. If larger amounts are to be made the same ratio of ingredients holds true. If the ice cream is to be held over for a day or

Ice Cream Suggested as Desirable Addi- tion to the Farm Bill o' Fare

C. D. Dahle, University Farm, says it may often be made with greater ease in the farm home than in the city home, because the "makings" are easily provided.

Recipes and methods of manufacture recommended in the accompanying article.

Ice cream for summer should be low in butterfat—ice cream for winter, rich in butterfat.

more one tablespoon of powdered gelatine should be added to the mix before freezing. The gelatine should be soaked in an amount of warm water sufficient to thoroughly wet it and then stirred into the mix. Gelatine will prevent the formation of ice crystals if the ice cream is held several days. It also makes a smoother product. Clean gelatine is a healthful food and no danger can come from its use in ice cream making. Gelatine or some similar stabilizer is necessary in commercial ice cream.

No. IV. Parfait—French Ice Cream

If a richer tasting ice cream is desired, eggs may be added to the above mixes or the following mix used:

- 2 quarts 20 per cent cream.
- $\frac{3}{4}$ pint sugar.
- 6 eggs (beaten)
- Vanilla to taste.

A mix of this type is usually cooked in a double boiler for 10 to 15 minutes at 180 degrees F. The yolks should be beaten until smooth and the sugar added. The whites should also be beaten and then mixed with the yolks. After this operation the cream is added and mixed. The mix should be cooled down to 40 degrees F. if possible before placing in the freezer. This ice cream is known as Parfait or French ice cream.

No. V. Chocolate Ice Cream, Fruit Ice Cream, Nut Ice Cream

All of these may be made from the first three recipes given. To make chocolate ice cream, add the powdered chocolate or cocoa directly to the ice cream, just before finishing the freezing, or make a thick chocolate syrup with water and sugar and add just before the freezing process is finished. Add enough to suit the taste. A little vanilla flavor added to chocolate ice cream will not come amiss.

For fruit and nut ice cream, add enough crushed fresh fruit or canned

fruit and chopped nuts to suit the taste. Add just before the freezing is finished. When fruit or nuts are added a cream of lower fat content may be used.

No. VI. Sherbets and Ices

These contain no cream and may or may not contain milk or eggs. They consist largely of water, sugar, and fruit juices. Ices are especially suitable for hot weather. An ice is listed below:

Dissolve 2 tablespoons gelatine in 1 pint of warm water.

Add 1 pound sugar.

3 pints water.

$\frac{1}{2}$ pint shredded pineapple.

Juice of 4 lemons.

No. VII. Mousse

This consists of whipped cream, sugar and flavor. It requires no mechanical freezing. The cream should be whipped until stiff, then the sugar and flavor folded in. The mix may then be set out in a snow bank, if in the winter, or packed in ice and salt and permitted to freeze. This is well adapted for winter use.

Use: $2\frac{1}{2}$ quarts of rich cream (35-40 per cent fat).

$\frac{3}{4}$ -1 pint sugar.

Vanilla to taste.

The Freezing Process

For ordinary ice cream.

Water freezes at 32 degrees F. while ice cream with all its ingredients freezes around 28 degrees F. Excessive sugar will cause the freezing point to go lower and a longer time will be required to freeze it. Ices and sherbets freeze lower than ice cream because of the amount of sugar carried.

Ice cream is frozen with a salt, ice, and water mixture. Ice alone will not produce a temperature low enough to freeze ice cream. Salt mixed with the ice causes the ice to melt and more heat will be absorbed than from ice not melting so rapidly.

The ice should be crushed into fine lumps the size of walnuts by placing in a bag and striking with the flat side of an ax. Then enough mix is placed in the freezer can to fill it one-half full and the can set in the freezer and adjusted in place. The ice should be packed around the freezer can until the tub surrounding the can is one-third full, when crushed rock salt should be sprinkled over the ice. After filling the tub with ice more salt should be sprinkled over the surface. A mixture of about 1 pound salt to 8 or 10 pounds ice should be used. Now water should be added to the ice until it flows out the hole in the side near the top of the freezer. The water is necessary if rapid freezing is desired. Water fills up the air spaces between the ice particles, forms brine which is a better conductor of heat than the air, and makes the freezer turn much easier. Much ice would otherwise need to be melted before a good cold brine would be formed. Adding the water is one of the most important steps in the freezing process.

The mix will soon give up its heat and become cold. The freezer should not be turned much at first, otherwise the fat may churn. Turning often enough to keep the cream from freezing to the can is all that is needed for the first 6 or 7 minutes. By this time the mix is cold enough to commence swelling, and now the freezer should be turned as rapidly as possible to incorporate air which is necessary to obtain a reasonably good yield and smooth product. It should be remembered that from one-fourth to one-half the volume of ice cream is air. The air is incor-

porated when the mix is cooling from about 34 degrees F. to 28 degrees F. and at this stage vigorous turning of the crank is necessary. After several minutes of rapid turning the can should be opened and the swelling of the ice cream noted. When the ice cream has reached its maximum volume the dasher should be removed, the brine drawn from the freezer, and the ice cream packed in ice and salt. This is necessary for proper hardening. Ice cream should not be frozen hard while turning in the freezer. Doing this drives out the air which the beating incorporated and decreases the yield. The increase in amount of ice cream over the amount of mix started with is termed swell or yield. The recipes quoted in these directions allow for 75 to 95 per cent swell. This may be readily obtained in most instances though it may not be desired when a very thin mix is used or in the case of sherbets or ices.

Ice cream made in this manner should have the consistency of heavy gravy when the freezing process is completed. Several hours should be allowed between the freezing process and consumption to permit proper hardening.

About 12 to 15 minutes time is all that is needed for the freezing process as described here, about 7 minutes with occasional stirring while the mix is cooling to 34 degrees or 32 degrees, and about 5 minutes of rapid turning to beat in the air while the mix is going from 32 degrees F. to 28 degrees F. The colder the mix when put into the freezer, the less time will be needed to cool down to 32 degrees F.

PREVENTION OF DISEASE AMONG DAIRY CATTLE

C. P. FITCH, UNIVERSITY FARM

There are many subjects which are of great importance to the breeder, keeper, or owner of dairy cattle. The selection of the breed, the selection of the individuals, the proper feed, and many other factors enter into the makeup of a successful dairyman. In our opinion, however, no subject merits more attention or study on the part of the owner of cattle or indeed of other animals than the prevention of disease.

It is an historical adage that an "Ounce of Prevention is worth a pound of Cure." This is particularly true in relation to certain infectious diseases which attack our dairy cattle. If one could go over the ledgers kept by dairymen, one would find in many instances that loss could be directly traced to the introduction of disease among the herd.

It has been stated that our modern dairy cow is more susceptible to disease than her ancestor which was kept out of doors during most of the year. There is no truth in this statement. It is, however, a fact that the opportunity for the spread of disease among dairy cattle has been greatly enhanced during the past few years. It is comparatively recent, that the cow born as a calf in New York might be shipped into a herd in California. In other words, the traffic in purebred livestock, has received a great impetus during the past decade, and along with this always comes added danger of the introduction of disease.

As a rule our cattle are kept under better conditions than they were twenty years ago. Dairymen have come to realize the importance of hygienic surroundings, proper feed and care for the dairy cow. This fact has

aided in the prevention of the spread of disease among this group of animals.

It is of course impossible in a short paper of this kind to cover the entire field of "Disease Prevention." The two most important infectious diseases of dairy cattle are tuberculosis and bovine infectious abortion. It is very questionable which causes the greater loss. Both are due to small germs each of an entirely different species. The infection cannot result unless the specific germ happens to be present. In other words, tuberculosis will not be present in the herd unless the germ of this particular contagion is introduced.

Tuberculosis

During the past few years, great strides have been made in the control of this disease. For years Minnesota cattle have been noted for their freedom from this infection. This does not mean that the disease is not present in this state, because statistics compiled from the testing of large numbers of cattle throughout the whole state indicate that $4\frac{1}{2}$ per cent of all the cattle of Minnesota are infected with this disease. Dairymen, however, are having their herds tested by means of the tuberculin test, and in this way the introduction of disease and its spread in the herd is greatly minimized. At the present time, an intensive campaign is being enacted in this state for the testing of the cattle. In Meeker County, an effort will be made beginning with September 17th, to test all the animals in the entire County. This is made possible by the appropriation by the last legislature of \$100,000 annually to pay indemnity

for condemned animals in the so-called "area" or "county" work. The counties themselves also make an appropriation to help defray the expenses of the test. This intensive work, combined with the general testing in the state, will go a long way toward the prevention of the spread of this infection.

It is impossible to go into details in regard to what is known as an accredited herd. It must suffice to state that this is a herd which has been tested by Federal and State authorities and has passed successfully without reactors two annual or three semi-annual tests. It is recommended in connection with this matter, that if further information is desired, that you write to Dr. C. E. Cotton, Secretary and Executive Officer of the Minnesota State Livestock Sanitary Board, Old Capitol Building, St. Paul, Minnesota. The work of tuberculin testing is in charge of this Board, and therefore inquiries in relation to it should be directed as noted above. There are two or three points that we desire to stress in relation to the prevention of tuberculosis.

1. This disease is usually introduced into a herd by an infected animal. Animals of course should always be bought subject to test and kept in quarantine for sixty to ninety days and then retested. It occasionally occurs that animals fail to react to the test even though they are infected. For this reason it is much better to purchase animals from herds which are known to be free of the infection, as well as to safeguard by means of the test.

2. Occasionally tuberculosis may be introduced in the herd by feeding milk coming from creameries which has not been pasteurized or the germs otherwise destroyed. It is therefore unwise to feed to calves, skimmed

milk or whey coming from cheese factories or creameries, unless one is sure that the germs have been destroyed. As a matter of fact there is a regulation requiring all such products be pasteurized.

3. Poultry are susceptible to tuberculosis. It is however, a different type of the germ than is found in cattle. It is known however, that poultry or avian tuberculosis can be transmitted to swine. It is a wise thing therefore, to tuberculin test or otherwise learn, whether or not tuberculosis is present among the farm flock. Examinations of specimens received at our laboratory indicate that tuberculosis of poultry is a rather widespread disease in this state, therefore it is wise to take the precaution to prevent the spread of this disease on the dairy farm.

4. If on test, the herd is found to be infected, all reacting animals should be condemned and slaughtered at once. It is unwise to attempt to keep reacting animals on the same farm with healthy ones. This has been tried in a number of instances and sooner or later in most cases, the infection has spread to the clean herd.

Constant vigilance is necessary in order to prevent the introduction of this infection. Male animals used for public service should be carefully avoided. The bull often times acts as a spreader of the infection. If further information is desired, write to the Extension Division, University Farm, for Special Bulletin No. 81.

Bovine Infectious Abortion

This disease is becoming more and more prevalent among our dairy herds. It is in comparatively recent times that the losses from this infection have assumed the importance and the attention that they now have. An occasional abortion has been known for

centuries to occur among cattle. The infectious disease due to a specific germ known as *B. abortus* Bang, has not been widely disseminated in this country except during the last quarter century. As stated in the beginning the opportunities for the spread of this infection due to the increased traffic in purebred livestock, has given an opportunity for the rapid dissemination of this infection.

The cause of the disease was discovered by a Danish Veterinarian, Dr. Bernard Bang in 1897. In this country a great deal of study has been given to the disease and extensive researches are now going on in respect to it. A number of points still remain unsettled, although our information is increasing.

It has been determined that the germs are taken in largely through the digestive tract, that is animals become infected by eating contaminated food, licking infected animals, or otherwise taking the germs in through the mouth. It has not been definitely proved that the disease can be transmitted through the genital tract; certain facts however, point in this direction, although undoubtedly the chief channel of infection is through the mouth.

Heifers during their first and second pregnancies, are more susceptible to this disease than older cows, although it must be clearly understood that older cows often abort. It is not a true statement that animals abort only once or twice. We have had an animal in our experimental herd which aborted five times and then gave birth to three living calves.

Abortion is usually introduced into a herd through an infected animal. The germs have been found commonly present in only two places, the pregnant uterus and the udder. The germs may remain in the udder indefinitely, but they have not been

found in the uterus longer than a little over two months following abortion or calving. Animals may harbor the germ in their udder and never abort. Bulls also may be infected. The germ has been found in the testicles and seminal vesicles. The male animal however, seems less apt to be infected than females. In certain respects abortion is a self limiting disease. It is a common history that a herd may have a storm of abortion for a year or two, losing practically the entire calf crop, and then the disease clears up and nothing more is heard of it for several years. This however, in connection with the disease has brought about numbers of treatments which have been called more or less efficient in the control and eradication of this scourge. Carbolic acid and methelene blue as well as a number of proprietary products have been recommended in connection with its treatment. So far as we know at the present time, there is no known cure for this disease.

Space will not permit a detailed account as to the symptoms and method of spread of this infection. Retained afterbirths may or may not be caused by this germ. It should also be clearly understood that there are other causes of abortion than the Bang germ. There are other varieties of bacteria as well as deficient rations and injuries, which may bring about the birth of an immature fetus. These latter however, in our opinion are not a common cause of abortion. It is always desirable to have a thorough examination made of the herd, if there is any trouble with the calf crop or with the breeding of animals. Sterility also may be associated with abortion disease, although the actual cause of sterility is not usually the Bang germ. Diseases of young calves as well as mastitis or garget are often associated with this infection.

It is very important for an individual owning dairy cattle in which this disease is not present, to guard against the introduction of adult animals. Calves are not usually infected between the ages of three and eight months. This statement does not mean that they may not be infected. The researches at the University Farm however, have shown that they are not usually infected as shown by the blood test. For this reason it is a much safer proposition for individuals purchasing animals to purchase calves.

As stated before, certain blood tests known as agglutination and complement fixation have been devised for the detection of this infection. They are reliable and can be performed at any laboratory. All one has to do is to draw about an ounce of blood in a sterile bottle by means of a hypodermic needle from the jugular vein of an animal, and ship it to the Veterinary Division, at University Farm. We test large numbers of blood samples for veterinarians and breeders of the state. It is wise therefore, before the introduction of any animal to have her blood tested to determine whether or not this disease may be present. It is also a wise plan if the disease is suspected in a herd, to have blood samples taken of the entire group and submitted for test. The results will give some idea as to the spread of the infection. It is a fact that a positive reaction is not positive evidence that an animal ever has or ever will abort. It is however, an indication that the animal has been or is infected with abortion disease.

In herds where the disease is prevalent, great care must be taken of the animals at the time of calving or abortion. The afterbirths of even normal calving sometimes contain the virulent germ. For this reason, calving stalls should be provided and should be kept clean and disinfected.

All membranes and discharges should be carefully destroyed either by burning or deep burial. Aborting animals should be segregated from the herd until all the discharge has ceased. Hygienic and sanitary conditions will go a long way toward the prevention of the further spread of the disease in a herd. If further information is desired, write to the University Farm for Special Bulletin No. 28.

Diseases of Young Calves

White scours or calf pneumonia are the two common causes of death among young calves. Various germs have been described as causing these conditions, and it is undoubtedly true that they are not due to a single agent in all cases. Calves are sometimes born infected and death in these instances usually results in from 24 to 36 hours after birth. The symptoms of white scours are well known and do not need further description. Calf pneumonia is denoted by high temperature, rapid breathing, rapid pulse, lack of appetite, and if in the chronic form an unthrifty condition. Sometimes pneumonia follows ordinary white scours. The treatment of these conditions is in many cases of little value. The keynote here as in other infections is prevention. A clean and disinfected stall should be provided for all calves. It is unwise to pen a number of young animals together, as they invariably suck each other, which is a most favorable way for the transmission of disease. Care should be taken to see that young animals, especially immediately after birth, do not obtain too much milk. Overfeeding is a common cause of scours. Some investigators recommend the pasteurization or boiling of milk fed to young calves, and in instances where the disease is very common, this might be a good plan. It should be noted that as much care

is necessary in rearing a calf as is necessary in raising children. The young of any species are more susceptible to infection, and therefore great care must be taken to prevent the introduction of disease germs. White scours serum has been recommended. This is a product which is injected under the skin and in certain instances has proven quite efficient. In others it is of little benefit. The treatment of pneumonia by medicines is usually unsatisfactory. The sick calves should be kept under the very best possible conditions in regard to heat and cold, a little milk should be given providing the animals will drink, and a stimulant such as camphorated oil may be administered subcutaneously. A mustard plaster over the chest has been used. At University Farm, we have found the administration of therapogen and castor oil combined in a proportion of three ounces of castor oil to one ounce of therapogen, to be very satisfactory in the treatment of white scours.

Mastitis or Garget

This is an inflammation of the udder caused by a variety of germs. A very common cause of the introduction of germs into the udder is by a dirty or poorly kept milking tube. Milking machines which are not properly cleaned, may also spread the infection in a herd. The udders of all cattle usually contain more or less bacteria. These commonly cause no trouble, but occasionally virulent organisms are introduced through the teat canal or through the circulating blood and lymph, and cause very acute or chronic inflammations of the udder. Occasionally this disease sweeps through a herd and many valuable animals are lost for milk production. Udders may become greatly swollen, the milk may become thick, hard

areas may develop in the udder and various other forms of the disease are known.

The treatment of these infections as a rule is very unsatisfactory. One cannot with safety inject material into the udder. Hot applications or in case of very acute inflammations, ice bags or cold water may be applied to the udder. Some have recommended the so-called formaldehyde treatment consisting of the administration of $\frac{1}{2}$ ounce of formaldehyde in a quart of milk, and repeat for three days.

In the prevention of the spread of the disease, great care must be taken in the careful cleaning and disinfection of the stable. The hands of the milker deserve particular attention, especially after milking infected animals. It is advisable to leave all infected animals until the last, when the hands should be carefully washed and disinfected before the milking of each cow. In certain instances it has been found highly satisfactory to dip the ends of the cow's teats in a disinfectant composed of $\frac{1}{2}$ per cent Wescol. This is a powerful coal tar disinfectant. After milking the cow, simply allow the ends of the teats to remain in a basin of this disinfectant from one-half minute to a minute. Often times this will prevent the spread of the infection in the herd.

Milk Fever

This disease is not infectious in character, and is often found among dairy cattle. It is usually present soon after calving, although we have many cases on record in which the disease has appeared a considerable time, both before and after parturition.

It is often found in cows that are heavy milkers, heavy feeders and in generally excellent condition. The symptoms of the disease are well known, namely a paralysis which may affect various portions of the nervous

system, the animal gets down, does not get up, no rise of temperature, head often held over to the side, eyelids drooped, etc.

Since the introduction of the air treatment (inflation of the udder), the mortality of this disease has been much reduced. This is an efficient treatment and if applied in time, usually brings about remarkable recoveries. There are certain individuals

who believe that if the animal is not milked out clean, that this will tend to prevent the disease. It is of course, very wise to cut down the ration just before calving, and get the animal into the very best possible physical condition, especially not too fat. These simple things will aid materially toward the prevention of the disease.

Beltrami County farmers have made a start in the right direction. Their County Agent tells about it in the following pages.



Sire owned by Beltrami County Guernsey Bull Association.

COOPERATIVE BULL ASSOCIATIONS IN BELTRAMI COUNTY

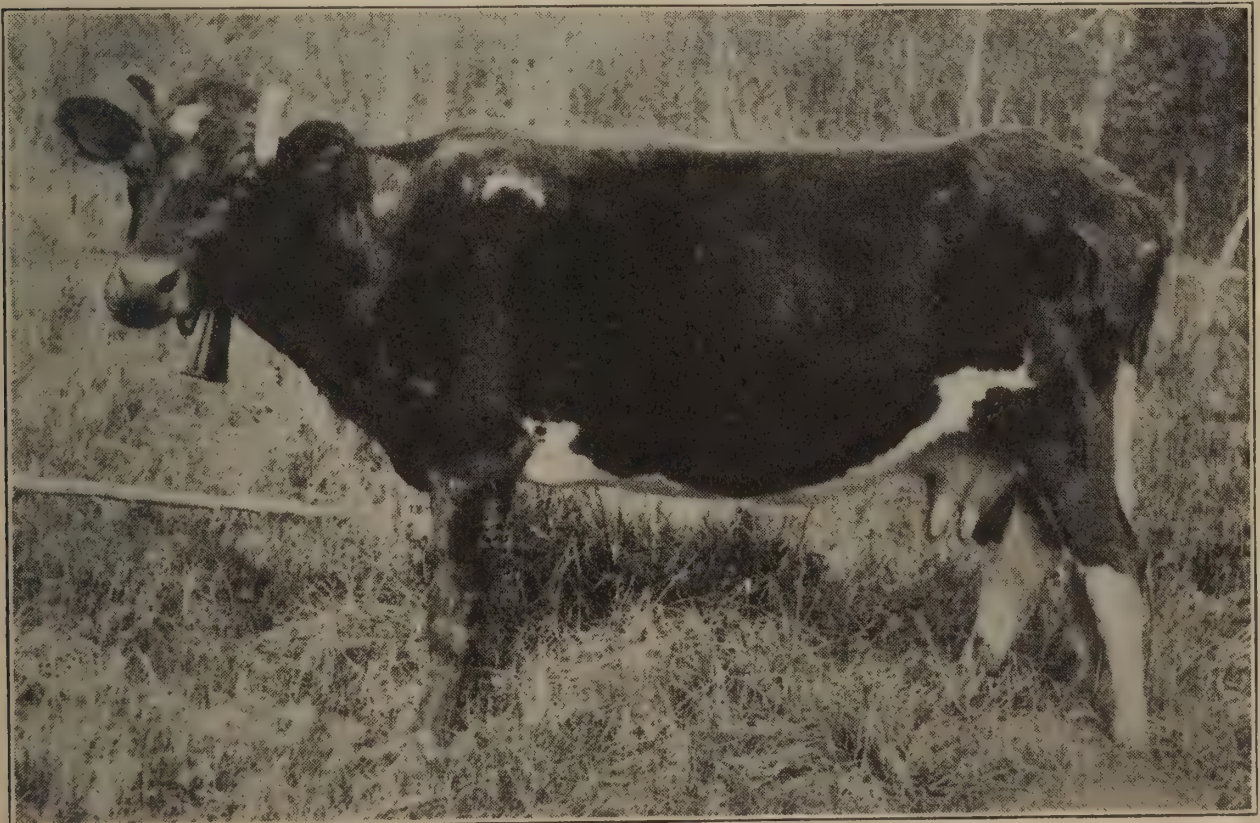
D. C. DVORACEK, County Agent

Many cows kept on farms are common cows or more generally known as scrubs, with an average production of less than the average butterfat production per cow of 160 pounds for the entire state. These cows are the result of the use of mongrel sires of uncertain ancestry, inbred, readily transmitting their undesirable characters but with no strong production features to reproduce; feeding with feeds low in nutritive value in sufficient quantities and indifferent care. The farmer does not produce common cows because he prefers them, but because his attention has been turned to the production of cash crops, with a resulting shortage of good feed; as no doubt every farmer would be a good feeder if he raised all his feed and did not need to buy much. Proven purebred sires or sires with ancestors with high

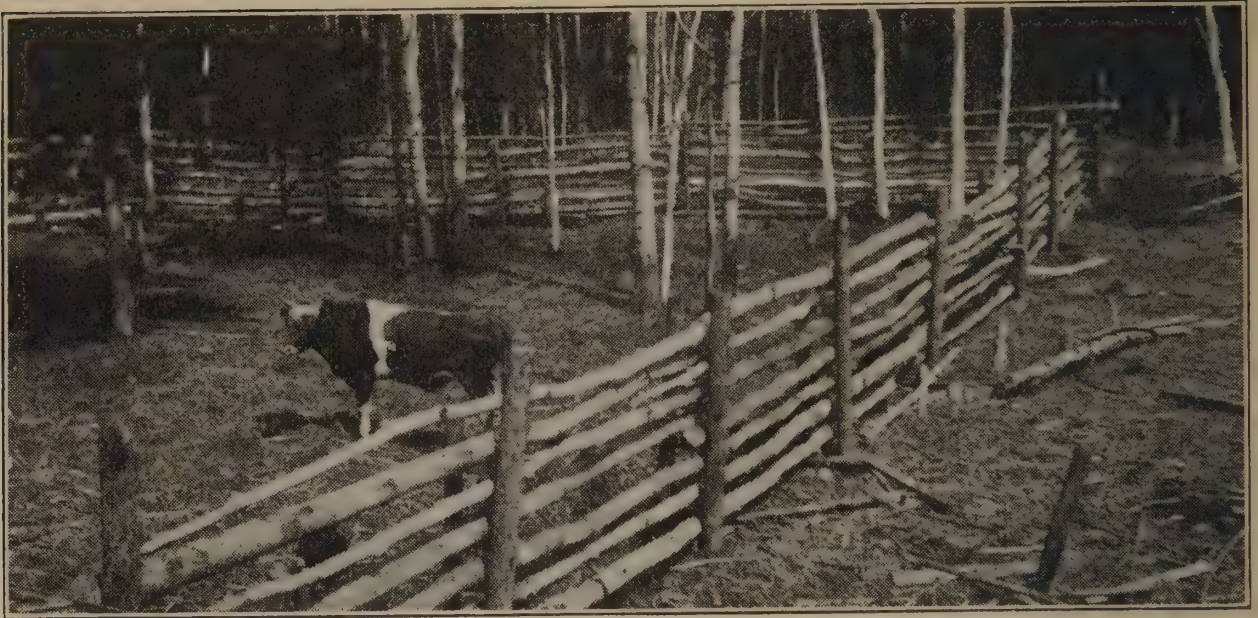
production records, have been scarce and hence high in price. Their use has been limited to comparatively few cows and a short period of usefulness. The number of calves with a purebred sire born annually is therefore relatively small. Beltrami County is no exception in this condition.

The average number of cows per farm in Beltrami County is just a fraction more than five. Manifestly it is not practical for the average farmer to buy a high priced purebred bull and then feed him for five cows. It is just as evident that he cannot afford to keep a scrub bull for five cows, or stake his development in livestock or his neighbors' choice of sires.

The cooperative Bull Associations offered a solution. Altho something on bull associations had been done during 1920, definite work was started



A typical common cow of the cut-over country.



Bull pen built of poles. Material and labor were donated by members of the Association. Total cash outlay was 85 cents spent for nails.

early in 1921. The cooperation of the U. S. Department of Agriculture was secured and by arrangement with the Agricultural Experiment Division at the University Farm, J. G. Winkjer, in charge of bull associations, agreed to spend the necessary time in the county to start the work. The first problem was to sell the plan. This was done at the regular meeting of Farmers' Clubs, Farm Bureau Units and special meetings called for that purpose. The advantages of this plan were explained and efforts centered upon the organization of blocks or groups of farmers who could first of all agree upon a breed and who were so located that they could use one sire without anyone taking his cow more than three miles. Agreement blanks were signed by farmers in each block designating the bull keeper chosen for this central location, and equipment to care for the sire. Effort was made to have at least fifty cows in each block to reduce cost. Fourteen such blocks or groups were organized the first year. Four of these blocks were then grouped into the first bull association and known as the Beltrami County Guern-

sey Cooperative Association No. 1, with nineteen members owning one hundred twenty-six cows, in three townships. The four bulls were purchased by the board of directors, one for each block and one elected at large. Shares were sold at a par value of fifteen dollars per share, one share for each group of five cows or less, it being agreed that a farmer with one or two cows derives more benefit per cow than the farmer who has a larger herd. The breeding charge was set at one dollar to pay for feed and twenty-five cents to build up a reserve on bull replacement fund. A safe keeper bull pen was built of poles by one block. Poles and labor being donated by the members at an actual total cash outlay of 85 cents for nails. The safe keeper pen does away with the objection of handling aged bulls. The blocks were numbered and the bulls will be exchanged every two years accordingly.

The next year two more associations were organized. The Hagali Township Holstein Cooperative Bull Association owns seven registered bulls in as many blocks. Several of

these blocks are single member blocks. No scrub sires are used in that township now. The Blackduck Guernsey Association has three blocks with twelve members. The Battle River Guernsey Cooperative Bull Association was organized the past winter with three blocks which have since been measured to four. Splendid cooperation was given this work by the banks, especially one line of banks which offered money without interest to any group of farmers for the purchase of a purebred bull.

The three years' work introducing better sires thru cooperative bull associations has resulted in the purchase of approximately seventy-five purebred sires in the county, and the organization of four bull associations,

owning eighteen purebred sires, by sixty-four farmers who own eight purebred cows and six hundred grade or common cows. Every herd in two associations has already been tested for tuberculosis. The value of all these purebred sires cannot be overestimated when measured by the number and the future production of their offspring. Each sire is used on an average of thirty cows or a total of 2,250. The two values of Bull Associations' work will be seen in the future when the constant use of a purebred sire of one breed over a period of years, will result in a herd of high grade of high producing cows, measuring the profit at the milk pail but also through the sale of breeding stock.

A GENERATION WITH JERSEYS

GEO. S. TAYLOR

I am using the word generation advisedly, for my children are now older than I was when my father bought his first Jersey cattle. In those days dairy knowledge and facts were not lurking in every fence corner waiting to jump out on the wayfarer in an argument for "Better sires," "Better barns," etc. Neither were the politicians in those good old bye gone days so concerned over the finances of the farmer.

It was before the days of the creamery, or the hand separator, when the manufacture of butter was conducted largely by the housewife. My mother made a very superior quality of butter. It was sold to private parties in St. Paul at considerably over the prevailing prices for dairy butter. When her trade became so large that it was a matter only of her ability to supply it, she told father that he would have to get some cows that would produce

more, also some whose cream would rise better, for you must remember she had to cool this milk in "shot gun" cans and skim it by hand. Father had a friend, Capt. J. H. Morris, who had a herd of purebred and grade Jerseys and from him when I was eight years old, father bought three grade heifers and a purebred bull. That was in 1890. By 1893 when the "Hard times" period struck the country, we had quite a few cows and the source of mother's pin money became the mainstay of the family. With wheat at less than 50c a bushel, oats 10-12 cents, corn (well Minnesota wasn't a corn state then) 20 to 25c, butter looked pretty good.

However, about that time the cooperative creameries began to organize and when our creamery was well started, mother gave up her butter making (it was an awful lot of work) and our milk went to the creamery.

Then it was that we found how much more butter there was in a given amount of Jersey milk as compared with other milk. The average of the creamery was 3.8, while our milk tested 4.8 to 5.4. About that time we commenced to get calls for milk and cream and as we needed every cent, we started a little milk route, my brother and I running it on commission as we went to school. Yes, Jerseys gave me my education. Then too, ice cream was just coming in vogue. I remember that at one time we supplied every soda fountain in town with cream for ice cream and it didn't take all the cream from 20 cows either. Today the same sized town will use a fair sized truck load of ice cream over Sunday in hot weather—to such proportions has the demand for that product grown.

To supply a cream of standard thickness, father invested in one of the first three hand separators used in the county. During this period we had been using purebred sires, but as it was before the days of testing for production, these sires had no records back of them. I well remember when father asked my teacher to excuse me from school (we went to the village school) so that I might go over to the Farmers' Institute and observe Supt. O. C. Gregg demonstrate the "Babcock test," and as soon as I was out of school and working with the herd, he bought me a hand tester. That same tester is still in use on my farm, tho at present it is mostly operated by "official testers." With this machine we tested and studied the different cows and gradually got rid of the poorer ones. When I was 20 years of age one of our neighbors offered to sell us an exceptionally well bred aged bull. As we had quite a herd, father thought he would not raise any more calves for a few years; but as I seemed to want this chap, he told me

that if I wanted to buy him, I could raise his heifer calves for myself. Now I'll say that it didn't take very long for me to make the deal for that bull; and so Jerseys gave me my start in business. Then years later with those heifers and \$20 in cash I began farming for myself. Two years after this the cows steadied my business ship thru the financial panic of 1907 and tho our books showed that I would have been better off had I been on a salary, yet we kept going.

In 1911 when I first came to Washington County, I somehow got the idea that I could do better with beef cattle and hogs. However, whether by luck or good sense, I kept the Jerseys till I should see how the other end worked out. At the end of 5 years I found that I had made money 3 years and lost 2 years and had it not been for the cream check, I would have been out of luck. Therefore we discarded the beef cattle. At this time thru a local cow testing association I had checked my dairy herd and found a very good average lot. In fact one year they topped the association with a 318 pound fat average. I wasn't satisfied with this and at this time, my neighbor, Mr. M. D. Munn was instrumental in getting me to buy some purebred cows. During the next 3 years we purchased some over 30 head. We didn't pay very big prices and only got a few Register of Merit cows, but we soon began to do official testing and now practically all of our herd are either tested or on test.

When I bought cows I generally bought them in lots where I found enough good ones to justify taking some poorer ones. Several went to the stockyards, because I didn't believe they were good enough for breeding purposes. For the first three years we had practically no animals to sell; but in 1920 we had some to spare.



Some of Mr. Taylor's Jerseys

These four heifers won first place in the "get of sire class" at the state fair in 1921.

Times were hard, but our cows hadn't cost us high prices and we were able to price our surplus stock so it moved. Since then the matter of selling has been easier.

As I look back over my experience with Jersey cows I am not surprised that I think highly of them. They helped me to an education, they started me in business and have saved the day in every financial difficulty I've ever had, whether it was my fault or from some other cause and so from now on as long as I am connected in any way with farming, I shall raise purebred Jersey cows.

Perhaps there are those who would like my idea as to the best way to start with dairy cattle, or with purebred cattle. Generally speaking I would not advise others to do as I

did. It costs too much and there is considerable risk. Work with grades, till you learn how to produce a lot of butter and produce it as cheaply as possible. Use a purebred sire that is a good individual and backed by good records. Then after you have a good grade herd it will be time enough to think about purebreds. Generally in such a case it is better to buy one or two good females and grow your own. But whatever one does, don't get the idea that you must pay an exorbitant price for a purebred or that the price is any criterion of the value. The ability to produce is what tells the tale and if I may repeat what I choose to call "The Dairyman's Eleventh Commandment," I would say—FEED, BREED, WEED AND ADVERTISE.

DAIRYING IN PENNINGTON COUNTY

HANS ANTON

My farm, when I bought it eleven years ago, had been badly run down by thirty years of grain farming. I soon saw that something would have to be done to restore the fertility of the soil, and decided to go into dairying. I started with a herd of grade Holsteins and a pure bred sire.

Having been a breeder of livestock all my life, I knew the importance of good feed and care. We raise all our feed on the farm excepting a little bran and oil meal. We feed clover and silage for roughage, and ground barley, oats and sometimes rye as concentrates. We aim to give one pound of grain for every four pounds of milk.

The last few years we have been raising a good deal of sweet clover. We find it a great pasture plant, but hard to cure for hay. We are planning to try a new way of curing it this year. We are going to cut it with a grain binder as soon as it comes in bloom, shock it the same as grain, allowing it to cure in the shock, then stack. In the fall we expect to run it through a cutter and store in the barn.

This year we have put in 10 acres of alfalfa on ground inoculated by sweet clover. If it is a success we plan to sow 80 acres next year.

We always plan to have a few more acres in pasture than we need, and more hay than we need. The better the feed the better the returns. We have regular hours for milking and feeding, and we keep tab on each cow, and dispose of those that do not produce at least 250 pounds of butterfat. The average of our herd last year was 375 pounds of fat.

We raise all our heifer calves. We take them from their mothers as soon as dry and give them three quarts of whole milk twice a day for two weeks, then teach them to eat a little ground oats and barley. At the age of six weeks we feed them skim milk and some grain.

After having practiced dairy farming for ten years I can say that my farm has grown more fertile, my stock has improved, and the sow thistle has not got the best of me as it has of the grain farmer.

GOOD live stock is the salvation of the Northwest; and the dairy cow holds the ribbon for profit making.

DAIRYING IN WINONA COUNTY

P. D. LEIGHTON AND SONS

Our experience in the management of our herd of grade dairy cows leads us to believe that the feeding and care of the animals is fully as important as the selection and breeding.

For several years we have raised our roughage in the form of medium red clover hay, corn silage and shredded corn fodder. We drill our silage corn, but aim to get fair sized

ears. The legume hay cheapens our ration, but when it fails (winter kills) we supply protein with oil meal. For grain we raise only corn and oats to feed. This is ground and mixed with bran and oil meal. We always feed bran in the ration, but aim to buy it in the fall on a low market. Our grain ration the past two years has consisted of ground corn and cob meal

325 Pounds of Butterfat

AVERAGE on Hans Anton's farm
at St. Hilaire, Minn.

He started with grade cows and a purebred bull ten years ago.

Farm was run down with grain-growing when he took it—Now it is more fertile—Legume crops have prominent place.

300 lbs., oats 200 lbs., bran 200 lbs., and oil meal 100 lbs. Roughages, mixed timothy and clover hay, silage and fodder.

Our experience teaches us to emphasize good feed and care and we found it advisable to feed the above rations, as our own records for three years and the cow testing association for sixteen months prove to us that cost is influenced by production. That is proper feed and care mean increased production, and higher production, to a certain degree, means lower cost of production.

As to care of herd we believe in and practice quietness, regularity, clean, fresh water, plenty of bedding and comfortable housing.

In our experience we find the cheapest and best way to solve the feed and care problem is to raise as

near as possible our own feed, but buy other feeds when necessary to keep up production. As said before that is our best means of keeping down costs.

For twelve years we have practised the method of keeping cows in the barn, though excepting the past three years, we turned them out for water and the stable then was not so well lighted or ventilated. The three questions that arise here over the matter of close confinement are health, breeding and production. From our experience we can say this. Not until two years ago did we test for tuberculosis. Now we are on the accredited list with never any reactors. The cows breed regularly, also we have never had abortion or other diseases. As to production we find by keeping close tab on our herd for five years a slight shrinkage each time after being out and never at any time a gain.

Cows are all tied in stanchions except during time of calving.

**Production of One Herd of 19 Cows
12 Months, 1921-22.**

Total production of butterfat..	6210.91 lbs.
Average herd production per month	517.57 lbs.
Average cow production per year	326.89 lbs.
Average feed cost per lb. butterfat	12½c
Total received for butterfat at 42c average	\$2,608.58
Total feed cost butterfat.....	\$776.36
Total net above feed cost.....	\$1,832.22
Average net above feed cost per cow	\$96.43
High cow 481 lbs. butterfat feed cost per lb. fat.....	10½c
Low cow 278 lbs. butterfat feed cost per lb. fat.....	17c

Feed Cost on Above Herd Past 4 Months.	
November	15c per lb. butterfat
December	18c per lb. butterfat
January	19c per lb. butterfat
February	18c per lb. butterfat

Average Feed Cost All Herds Winona Cow Testing Association.

	Fed Silage	No Silage
Nov.	20c per lb. butterfat	26c
Dec.	25c per lb. butterfat	35.5c
Jan.	26c per lb. butterfat	35c

Cost Influenced by Production—Figures From Winona Cow Testing Association, 12 Months, 1921-22.

131 lbs. cow cost per lb. butterfat....	25.5c
163 lbs. cow cost per lb. butterfat....	21c
305 lbs. cow cost per lb. butterfat....	11c

Cows Must Freshen in Fall. Greater Production—Less Cost—More Profit.

Received for butterfat:	
June, 1922.....	40c
Dec. 59c	
Cost per lb. butterfat:	
June, 1922.....	03.5c
Dec. 18c	
Net over feed Cost:	
June, 1922.....	36.5c
Dec. 41c	
Received for butterfat:	
May, 1922.....	38c
Nov., 1922, 60c	
July, 1922.....	37c
Jan., 1923, 57c	

Comparison Two Herds Winona Cow Testing Association on a Par as to Breeding.

	Fed a balanced succulent ration Good Feed and Care	No succulence and not as Good Feed and Care
Average Herd Production Per Month.....	517.57 lbs.	318 lbs. butterfat
Average Cow Production Per Year.....	326.89 lbs.	192 lbs. butterfat
Average Cow Production Per Month.....	27.1 lbs.	16 lbs. butterfat
Average Feed Cost Per lb. Butterfat Year.	12½c	23c

DAIRY FARMING PAYS, STEELE COUNTY PROVES

Farmers Near Owatonna Satisfied With Results Gained From Diversified Agriculture Combined With Cattle, Hog and Sheep Raising.

BY CHARLES F. COLLISSON, OF THE MINNEAPOLIS TRIBUNE

If you labor under the delusion that Northwestern farmers are all hard up—or that the farming industry is in the "doldrums," just make a little journey to the homes of the successful dairymen around Owatonna, down in Steele county, Minnesota. This is one of the smallest counties in the state; with one of the largest butter productions.

It affords an illuminating example of what dairying can do for any community that adopts it as its major enterprise.

Just sit down for a little heart-to-heart talk with Owatonna's bankers

and business men. Ask them about the increases made in bank deposits during the past five years; which are supposed to have been the most trying in the history of the farming business. They are particularly close to farming conditions, because dairying is the "paramount issue" in Steele county.

Talk to the farmers down there who are milking cows, feeding pigs and raising chickens. Everywhere you will find plenty, prosperity, and contentment.

If you want to know what kind of farming pays a real profit right now,

in spite of all the hue and cry for government aid that is coming from the wheat growing districts, just make a little investigation into the methods of these Steele county farmers.

No Hidden Treasures

The revelations there may surprise you. You will unearth no great mysteries, or hidden treasures. There is really no real secret about the success of these farmers. They have discovered no gold bricks hidden under their evergreen hedges, or flowing oil wells down in the meadows.

In fact, there is nothing else down there but the same green grass and pure water, so abundant all over this state. In the fields nearby are the same green alfalfa and corn, no better and no more luxuriant perhaps than those in most other Minnesota communities.

The bankers, however, will tell you that the total deposits in this county's banks have increased more than \$2,500,000 during the past five years; and that on last June 30 they totaled \$7,452,755.22, as compared with \$4,870,644.69 in 1918. They also say that, besides all this, the county's contributions to the oil and automobile industries have amounted to another \$5,500,000.

The farmers will also tell you why there are no complaints about hard times, or demands for governmental wheat price fixing, coming from Steele county. One of them told me why recently.

They're Just Dairy Cows

"It is because we have cows," he explained. "Good dairy cows, making money for us farmers, working while we sleep, making milk and cream and butterfat, out of our field crops.

"We dairy farmers have a harvest twice a day in the milk pail, and a

regular pay-day every 30 days or oftener. There are 23 creameries in this county, every one of which is co-operative, or owned by us farmers ourselves. You can see for yourself at almost every turn of the road, one of these neat, little butter factories, clean as a Dutch housewife's kitchen, where our fresh cream is churned into butter every day in the year. Why should we worry about the price of wheat? Butterfat prices always hold up remarkably well, even when the other farm product prices are sagging. As long as we attend to business, feeding our cows, increasing our herd production by breeding up with good, pure-bred sires, and culling out the unprofitable 'boarders,' we need not complain about our incomes. It is hard work milking, but that's a good way to turn labor into money."

Now of course, this is really an old story; for the same thing is being told in every dairying county in the Northwest, wherever the cows are numerous and are being well cared for by their owners. Steele county conditions are not at all unusual. Rather they are typical of those all over southern and central Minnesota and parts of the western states wherever dairying and diversified farming are being practiced.

Some Bank \$3,000 Yearly

When he told me, however, that 22 farms of average size and equipment, none of them particularly spectacular or outstanding in any way, had made an average income in cash of just about \$3,000 each, over all expenses last year, I began to sit up and take notice.

"They won't go broke doing that," he added.

"How do you know that?" I demanded. "You know how a good many farmers keep books. Do these men really know how much they

made, or are they only 'kidding' themselves? Have they charged off all the items of depreciation and cost, of labor, interest and rent, the same as any other business man would do? Or do they simply have a bank book, and measure their gains by the size of their deposits at the end of the year?"

"You bet your life they know," replied my informant, and then he told how they know it.

"They have been keeping accurate records of their entire farm operations for over three years, on a uniform and standardized system, according to expert accounting methods; and they know what their production costs are, exactly."

He then referred me to Prof. George A. Pond, assistant professor of farm management at University farm. He showed just how this has been accomplished, through the aid and co-operation of the U. S. Department of Agriculture, the Minnesota College of Agriculture, and the farmers themselves.

Complete Record Kept

"Since January 1, 1920," he said, "this group of farmers have been keeping complete cost accounting records on their farm operations. These records have been kept strictly according to the system worked out by this division of farm management. At the close of each year, the figures from each farm are carefully summarized, checked up and analyzed by the representatives of the college. Each farmer is then furnished with a comprehensive statement, showing the actual condition of his year's business. These reports include, not only a summary of the yearly operations as a whole; but also detailed statements of the actual costs and returns from each class of stock, each crop and farm enterprise. Edward T. Helgeson, the route statistician, is stationed at Owa-

tonna, visits these farms and keeps the records checked up, and accurate.

"Here is the statement of the average net returns from these 22 farms in 1922," Professor Pond continued. "It certainly shows that this dairying and diversified farming, with live stock and milk cows, swine and poultry, is a profit-paying business, even in times of so-called 'agricultural depression.' I do not know what better evidence we could present, than this very statement, of the soundness of the 'cow-sow-and-hen' doctrine of farming, which The Tribune has been promoting so diligently."

Statement Proves Policy

The statement follows:

Net returns over receipts on 22 Steele Co. farms for 1922.	
Receipts:	
Horses	\$ 35.00
Cattle	898.00
Dairy products	1,366.00
Swine	1,247.00
Poultry	157.00
Sheep	10.00
Crops	221.00
Miscellaneous receipts ..	115.00
Total	\$4,049.00
Expenses:	
Hired labor	\$ 217.00
Crop expense	171.00
Livestock expense	542.00
Feeds purchased	186.00
Machinery expense	501.00
Building and fence repairs	109.00
Taxes and insurance....	253.00
Interest	179.00
Miscellaneous	35.00
Total	\$2,193.00
Excess of cash receipts over cash expenses	\$1,856.00
Value of farm products used in house	214.00
Estimated house rent (12 per cent of \$1,800)	216.00
Increase inventory	713.00
Total income	\$2,999.00
Value of unpaid family labor, 2499 hours at 17½ cents.....	437.00
Excess of income over expenditures	\$2,562.00

"The receipts and expenses shown in this statement, are all cash receipts. In other words, \$4,049 was the average amount received in cash from the sale of all farm products, such as live

stock and horses, swine, poultry and sheep, crops and dairy products.

"The expenses for the year represent what was actually paid out in cash, for hired labor and other costs, so that the actual balance in cash was \$1,856.00. This represents what each farmer had available to spend for personal and living expenses, recreation and education, as the result of his year's operations.

"Remember of course, that this is the average. Some of these farmers had a great deal more than that. In addition to this cash, the farmer and his family also had home grown meats, eggs, poultry, milk, cream and other farm produce to the value of \$214. We have not calculated garden truck and vegetables, of which it is impossible to keep an accurate account.

Garden Truck Valuable

"The value placed on these items, is the farm price, and not that which we town folks would have to pay for them delivered to the door of a city apartment. This of course would be much higher, perhaps twice as much or more.

"These farmers also had the use of the farm house to live in. The value of this item, or \$216, has been figured very conservatively.

"There is another item also, that many farmers overlook. This is the increase in inventory. Even farmers who do keep accurate accounts do not always know really how their wealth is increasing, all around on the farm, in the form of more pigs or livestock, dairy cows or more buildings and equipment.

"The inventory of these farms showed that, at the end of the year, there were more stock and more feeds and supplies on hand than at the beginning. The price of the feeds had also advanced. Of course this rep-

resents potential income. It has therefore been added to the other items, bringing up the total to just about an even \$3,000.

Not Considered Net Income

"This amount cannot strictly be considered as net income to the farmer, however. We find that the members of the family performed 2,499 hours of labor on the farm during the year. For this they received no return in cash. The item of "hired labor" in the statements includes only the cash paid out to others. If this family labor is valued at the same rate as the average farm hand received in the locality, or 17½ cents an hour, and the total value of \$437 deducted from the total income, the farmer still has an average net income of \$2,562.

"This includes the reward for his own labor, and the return on his capital invested.

"Analyzing this income further, we find that he has a little over \$82 per month left for his own wages, if we allow five per cent interest on the average capitalization of these farms, in lands, buildings, stock and equipment.

"Several of the enterprises on these dairy farms contributed substantially to the income. Notice that the three items of largest return are dairy products, swine and cattle sales. It is interesting also to see that the crop sold off the farms, were not large; indicating that most of those grown were feeding crops and were fed to livestock.

Balanced Agriculture Practiced

"This means, of course, that a large part of the fertility of the soils of these farms is not being depleted. It is remaining right there, to insure the permanence and stability of this system of diversified, balanced agriculture.

"Butterfat, the principal dairy product, was produced at an average cost of 40½ cents a pound on all farms, and as low as 26 cents on one of them. The average price received was 45½ cents, or a very nice spread of five cents average profit, over and above all the expense of production. This was sold principally to co-operative creameries, and the skim milk was generally fed to pigs and young cattle.

"Pork was another profit maker. It sold for an average price of \$8.43. One farm produced pork as low as \$4.50 a hundredweight, and sold it for \$7.83 a hundredweight, at a nice tidy profit.

"The chickens, as usual, proved to be one of the best profit making enterprises on the farm, for the money and time invested. The average receipts from these farm flocks, given just the ordinary care and attention that they usually get on the farm, from the farm women, were \$171 above all expenses. Most of the field crops sold were also produced at less cost than the price received."

Risks Are Not So Many

With the risks of farming spread over so many diversified enterprises, each one balancing the other, and utilizing all of the by-products economically, a secure system of farm income has been devised by these farmers which results in substantial returns.

These farms vary in size and equipment. Most of them are dairy farms, with grade or purebred Holsteins, and a few Ayrshires, Guernseys and Short-horns.

To give an idea of how the returns from these farms provide for their owners and their families, the net income of each is shown below, in a different arrangement from that of the list of members above:

"The income shown represents the sum of the cash receipts, and the increase in inventory, less the cash ex-

penses paid out. It does not include house rent, or family labor. In other words, besides these amounts, each farmer had also his house to live in, and the farm produce used in the home," says Professor Pond.

Net receipts from 22 farms, Owatonna statistical route, 1922:

Farm No. 1	\$6,384.85
Farm No. 2	4,775.85
Farm No. 3	3,984.27
Farm No. 4	3,536.82
Farm No. 5	3,090.12
Farm No. 6	2,771.36
Farm No. 7	2,443.34
Farm No. 8	2,364.07
Farm No. 9	2,297.35
Farm No. 10	2,279.83
Farm No. 11	2,273.71
Farm No. 12	2,257.59
Farm No. 13	2,236.70
Farm No. 14	2,215.55
Farm No. 15	2,174.45
Farm No. 16	1,949.51
Farm No. 17	1,733.15
Farm No. 18	1,647.12
Farm No. 19	1,336.31
Farm No. 20	1,051.62
Farm No. 21	1,035.53
Farm No. 22	1,023.41

"With incomes like these coming in, on dairy farms that are growing most of their own feeds, and turning them into pork, cream, butterfat, eggs and poultry, it is neither fair to the farmers of the state, or to the community, to say that farming is being conducted at a loss generally, or that the business is on an unsound basis. Such a condition as exists in Owatonna is typical of the other dairying counties of the state.

Farm Is Well Equipped

As a typical single example of a dairy farm, and what it can produce under present conditions, Professor Pond cites that of Grass Brothers, A. P. and A. F., two members of the group who are farming in partnership

on their father's farm of 208 acres, three miles northeast of Owatonna. They were raised in this community, and have been on this farm for about five years.

The father who owns the farm has retired, and lives in town. They have a good modern house and a large barn. The latter has a concrete floor and mangers, and is practically but not elaborately equipped with some steel equipment. They have two stave silos, in which they put up 165 tons of ensilage last year.

They had no alfalfa, but are seeding some this year. Their herd averaged 18 or 19 cows last year, all grade Holstein cows, and a good purebred sire of the Ormsby breeding. They bought the cattle five years ago, and have been grading up the herd ever since. Their cows had an average production of 238 pounds of butterfat last year, figured exactly from the amount of their cream checks.

Butterfat Cost 26 Cents

These two men produced butterfat the cheapest, at only 26 cents a pound, which they sold at an average price of 45 cents. This profit of 19 cents a pound, figures \$45.22 per cow. The gross receipts from the herd were \$1,981.35; expenses, \$1,144.78; net profit \$836.57, to which is to be added their own labor charge, of \$465, received for caring for the herd.

"The low cost was due," says Professor Pond, "to their economical labor cost, and their good feeding. They are good managers. They paid out only \$47.75 for hired help. One-third of the cost of their butterfat was for labor, and they did most of that themselves. Then, too, they used a mechanical milker to help them out.

"How many farmers complain of the hard work of milking cows. But it is interesting to notice how this same labor is made profitable in dairy-

ing. The average wages paid to farm hands in this locality was 17½ cents an hour. But the average return made to these Grass boys, for the time devoted to their cattle, was 52 cents an hour, or nearly three times the going wage.

Hogs Produced Cheap

"They also had the most economical hog production. They produced 28,305 pounds of pork, at a cost of \$4.57 a hundredweight. The average price received was \$7.83, or a profit of \$3.36 a hundredweight. Their hog enterprise paid them a net profit of \$951.05. This swine production also gave them a profitable market for their skim milk, and for their corn. This shows, too, how livestock will increase a farmer's profits.

Their corn cost them, on an average, 44 cents a bushel. By feeding it to hogs, however, they got for it an average of \$1.15 a bushel, or more than double the market price. They are raising grade Poland-China hogs, using a purebred boar."

The following statement of their farm income, figured on the same basis as the previous one for the route, is interesting. It is not the largest income on the route, and yet they received a net return of \$3,377.39 for their time and management. This is after charging off \$1,300 cash rent paid for the farm to their father. The \$674.58 expense for machinery also includes the price of an automobile.

Grass Brothers' Receipts and Expenses

Receipts—

Cattle	\$ 509.15
Dairy products	1,904.41
Swine	2,466.00
Poultry	184.52
Crops	84.37
Miscellaneous	75.00

Total receipts ...	\$5,223.45
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Expenses—		
Labor	\$	47.75
Feeds purchased ...		131.20
Crop expense		233.19
Livestock expense .		215.35
Real estate		242.15
Mach. and auto....		674.58
Insurance and taxes		40.93
Rent of farm.....		1,300.00
Miscellaneous		41.65
Total expenses ..		\$2,926.80
Excess of receipts over ex-		
penses		\$2,296.65
Value of farm		
products used	\$	164.89
House rent		226.50
Increase in invent'y		758.04
Total income		\$3,446.08
Unpaid family labor..		68.69
Total net income..		\$3,377.39

Fisher brothers also kept an average of about 32 cows, grade and pure-bred Holsteins. They produced butterfat at 34 cents a pound and sold it for 45.5 cents. The gross receipts from their herd were \$2,554.10, including the skim milk they fed to hogs,

and the dairy products used at home. Their expenses were \$2,037.63, including the feeds raised on the farm, \$937.58 and the man labor, mostly their own, \$528.89.

This farm labor of their own paid them 34.5 cents an hour, as compared with the going wage of 17.5 cents, and the net return from their cows was \$516.47 in addition to this reward. They fed their skim milk to pigs, and marketed 18,000 pounds of pork last year.

These young men are good dairymen and hard workers. Their father, who lives with them, is an old settler there, and they have lived on the farm all their lives.

Albert Fisher gives a good example of profitable swine production. He marketed 13,507 pounds of pork. The average cost was \$5.65, and his average selling price was \$8.94. He received \$1,207.52 for hogs and his expenses were \$764.07; the net return, \$543.45. The expenses included \$124.25 for his own labor and time, and \$606 for the feeds raised on his own farm, both of which he turned into good money by keeping his pigs in connection with his dairy cows.

HOUSTON COUNTY DISPLACES BEEF WITH DAIRY COW

BY W. D. STEGNER, HOUSTON COUNTY AGENT

Houston county, Minn., has only recently taken up the active work of improving and increasing the dairy industry. Because of her strategic position in the Corn Belt the county has always been a strong beef and hog production center.

With the depression of the beef price following the war, farmers have been turning steadily to the dairy cow as an efficient producer of food and a consumer of raw products.

There are 11 creameries in the county, nine of which are co-operative. Most of these are members of the Minnesota Cooperative Creameries Association. All of the creameries are on a good sound working basis, and at the present time the Spring Grove creamery is rebuilding at a cost of \$44,000.

Butterfat Highest in State

Within the last year two testing associations have been formed. The Houston testing association with 26 members was formed in November, 1922. The association started out with an average production of 19 pounds of butterfat, and topped the state list last May with a record production of 36 pounds per cow.

Every month since the organization boarder cows have been marketed and about three carloads of improved stock have been purchased. Success of the association has been due to the work of H. White, the tester, and the following officers: G. C. Rank, president; A. E. Swenson, vice president; Orson Hempstead, secretary; Q. C. Lufi and Ed Sennes, directors. Twenty-five of the 26 members have pure bred sires; 13 of the 26 herds have been tested for tuberculosis.

Saving in Testing Skim Milk

The Allamakee-Houston association was formed in July, and started with an average production of 21 pounds.

Farmers have reported a big saving in the efficiency of their separators since testing the skim milk. Ove Fossum, an agricultural school graduate, is the tester. Officers of the association are: Paul Wheaton, president; Carl Burtness, secretary; A. Schwartzhoff, vice president, and J. A. Schulte, treasurer, of Caledonia.

Testing associations have increased the interest in calf club work, and 17 dairy calves were shown at the county fair at Caledonia last week. Members of the Caledonia Commercial club donated \$200 for special calf club prizes to be awarded at the county fair.

A large number of farmers are going into the dairy farming at the present time and considerable attention is being paid to improvement of dairy stock. Farmers purchasing dairy stock are putting emphasis on dairy form and are requesting that records be furnished. Bankers throughout the county lend their co-operation and give assistance in purchasing better dairy animals.

Will Buy More Animals

A number of farmers and the county agent will make a trip to Wisconsin in the next few weeks to secure Holstein and Guernsey animals.

A large part of the protein feed this year will be supplied by soy bean hay and meal. Over 200 farmers are growing beans. Yields of 25 bushels have been secured. Although alfalfa has been slow in becoming established some thrifty stands have been secured when lime is applied. Many farmers are having their soil tested for acidity and will plant alfalfa next year.

It is almost impossible to buy cows in the county because of the demand. More than 100 purebred dairy animals were exhibited at the Houston county fair.

"COWS, COLLEGES, CONTENTMENT," NORTHFIELD SLOGAN; FARMERS AND BUSINESS MEN UNITE IN COMMUNITY CLUB

BY CHARLES F. COLLISSON IN MINNEAPOLIS TRIBUNE

Northfield has the right idea—a community club, with an exceptionally able hustler as a paid secretary.

He is also secretary of the Holstein club, manager of the Rice County fair, and general all-round booster and entertainer of visitors for Northfield community, the slogan of which is: "Cows, Colleges and Contentment."

The club, made up of business men in town and the farmers in the country, is neither a commercial club nor a farmers' club. It is a combination of both and an evolution from both. For in the Northfield community, the interests of both business men and the dairymen are so closely intertwined, as they should be in every rural community, that they both recognize the advantages of pulling together all the time.

"The Northfield spirit," proclaims the club, "Is the spirit that fraternizes, that boosts, that helps each other."

The club owns its own building in Northfield, which is also the city hall. It contains a public rest room for women, with a matron in charge. There are eight farmers' clubs in the community besides, and more than six thousand Holstein Friesian dairy cattle; more than three hundred breeders of the "black and whites." For Northfield community would have you know, which is a fact, that she is the Holstein cattle center of America.

Finest of Herds

To exemplify her slogan of "Cows, Colleges and Contentment," she shows her guests some of the finest herds of cattle in all North America, on farms surrounding a college town with splendid grade schools, a high school

and two higher institutions of learning, Carleton college, with 634 students, and a faculty of 59; St. Olaf's college, with its famous choir, the college of the Norwegian Lutheran Church of America, with 790 students and a faculty of 53.

Carleton college is seriously embarked in a dairying and cattle breeding enterprise of its own, with one of the famous Holstein herds of the Northwest, kept to supply its students with fresh milk and other delicious products of the dairy.

It is in charge of an able manager, Walter Hughes, who takes great pride in showing his big black and white beauties to anyone who loves fine cattle. It is a pleasure to discuss records and pedigrees with one so enthusiastic about dairy cows. And of course, "cow talk" is a common topic of conversation around Northfield.

A New "Slant"

Three of us drove down to Northfield from Minneapolis and we all got a new "slant" on the community idea there in dairying. We had a date with the secretary in the evening, when he promised to have some of the leading breeders at the club to meet us. Walter Hughes, A. J. Lashbrook and half a dozen others dropped in after the milking and chores were over. We all talked about what the Northfield community is doing.

"What is being done," I asked them, "by the town bankers and the business men here to foster this dairying industry? You have seen write-ups in The Tribune about what other communities are doing? Who finances your calf club, importations of cattle and all that?"

Mr. Hughes looked at Mr. Lashbrook and grinned. Mr. Lashbrook smiled back. Neither said a word.

"What's the joke boys," I asked, "Let me in on it."

"See here, Collisson," said Mr. Hughes. Get this Northfield situation right, will you? All those stories are fine dope in places where they need it—and we know that there are lots of counties where they do need it. It is very fine and all that. Far be it from me to disparage it. It's mighty good work.

"But, say, get this straight. In Northfield community nobody has to 'foster dairying.' We passed that stage a long time ago. If we organize a calf club, f'r instance, we organize it, that's all. We go out, buy the calves and go ahead. In fact, we furnish the pure-bred calves for some of the best junior clubs in the state. Here the boys and girls have the money to buy their own calves with.

"Northfield has three banks, moreover, that had deposits of about half a million in 1899. In 1920 they were stuffed full of dairy farmers' money, \$4,464,759. Don't you see the point?"

I did see the point. In fact dairying there, far from needing any "fostering," comes pretty nearly doing that same job for everything else in the community.

Just an idea of what dairying means in this community can be had from the fact that it has a beautiful country road, running out east six miles to the Goodhue county line, that they call "Wall Street Road."

"How did it get that name?" I asked.

Not a Mortgage

"You'll find the answer in the stars," replied an old-timer, who meant that it had always had this name.

But I soon learned that an older generation of prominent dairy breed-

ers had settled along this stretch of road, all of whom milked cows and prospered until there was not a mortgage on any farm along the entire mileage. Dairy cows had paid for their farms and created a surplus.

Dairying now is not confined to Wall Street road, but forms the golden setting for the entire Northfield picture. In fact, it is well known all over North America that there are two great markets for fine Holstein cattle, Waukesha, Wis., and Northfield, Minn. As high as four carloads a week of fine purebred and grade stock are shipped out all over the United States. Buyers flock to "Wall Street Road" like jewelers do to Maiden Lane, and furniture buyers to Grand Rapids.

Northfield Community, in 1903, had only three Holstein breeders. Today she has 300. She has 75 members of the National Holstein Breeders' association and organized the first Holstein cattle club in the United States, 18 years ago.

Milk Producing Center

Practically 99 per cent of these breeders are members of the Twin City Milk Producers' association, for the close proximity to the Twin Cities makes it essentially a whole milk producing center, rather than a great creamery community, like others farther away. The producers' association, however, manufactures a substantial volume of dairy products in its plant, whenever there is a surplus supply. Many of the Community club members who are most active in boosting Northfield live outside of Rice county. This enables Northfield to take an active part in the agricultural activities of three counties and this she does with right good will. She is also thrice blessed with three county agents to co-operate with, instead of only one.

SOME DAIRY NOTES AND REMINDERS

By C. H. EKLES, UNIVERSITY FARM

HAVE COWS IN GOOD FLESH AT THE TIME OF CALVING

The cow should be in good flesh at time of calving for the best results during her milking period.

To get a large milk flow, it is necessary to start the cow at a high level of milk production, or as often expressed, to have her make up a good bag. Cows due to freshen in the fall if in good condition, should have good pasture in the summer. If the pasture does not keep them in good flesh, a small grain feed will pay by

returns when the cow comes in milk. Altho milk and cream are low in price, grain is likewise, and the same rule holds as during the winter.

If you are going to feed the cow what it requires to keep her, do chores for her, run the risk of her dying, and pay taxes on her value, you cannot afford not to give her all the raw material she can use in the way of feed to convert into milk.

PASTURE NOT NEEDED BY THE YOUNG CALVES

The Dairy division, Department of Agriculture, University of Minnesota, has found that during the first two or three months of life the calf does best if kept in a dry lot and in the barn. During this period, the young calf does not eat grass enough to amount to much and does better if given a little bright hay instead. The young calf also suf-

fers from heat and flies and does not seem to be able to look out for itself.

For skimmilk calves three to six months old a small pasture near the barn, where they may be easily fed and looked after, is ideal. Shade and plenty of water should be provided. A row of small stanchions suitably located are almost indispensable if many calves are to be kept together.

MODERN STALLS KEEP COWS CLEAN

During the winter season when cows are housed much of the time it is especially difficult to keep them clean. The only practical way is to prevent them as far as possible from becoming dirty. The practical way to do this is to use the modern stall. This stall consists of (1) a platform of proper length (56 inches for Guernseys and 60 inches for Holsteins); (2) a stanchion (preferably a swinging stanchion) which will prevent forward and backward movement; (3) a gutter in the rear of the cow at least 9 inches deep and 16 inches wide to contain the droppings.

When the cow is tied in such a stall

most of the droppings fall into the gutter, the platform remains reasonably clean so that the animal does not become coated with manure every time she lies down. The manure should be removed at least twice each day and plenty of bedding should be used on the platform.

If visible dirt is present in the region of the udder and flanks at milking time it should be removed by grooming. A covered milking pail, which can be purchased at any dairy supply house, will keep from 60 to 70 per cent of the dirt out which otherwise falls into the milk from the cow during milking.

FLIES NOT SOLE CAUSE OF SUMMER MILK DECLINE

During the months of July and August the milk flow generally drops off badly. At this time the cows are tormented from morning to night by flies and the common idea is that the flies are responsible for this drop in milk.

There is some justification for this belief, but the fly is not the sole cause. In fact, the drop in milk flow is the result of a combination of causes.

The real trouble is the cows do not graze enough and can't keep up milk production because they do not eat enough. The reasons for not eating more are the hot weather, the flies, the unpalatable condition of the mature grass in seasons of good pasturage, and in most seasons the shortness of the grass. I have found that using fly repellents does not increase the yield of milk enough to be noticeable, although by spraying

the animals once a day it is possible to keep them reasonably free from flies. The most important thing to do is to make it easy for the cows to get all the feed they need. They should be in the pasture early in the morning and during the night, as little grazing is done in the heat of the day.

Medium and heavy producing cows will pay liberally in milk for some grain. If pastures get short hay will be needed as well; or better still, silage. The time is coming when silage will be kept on hand for use in case the pastures become dry and short. The practical way to handle the summer feed situation is to have a small silo especially for summer feeding. If it is not needed it need not be opened and may be used the following season as silage will keep perfectly well for several years.

DAIRY BULLS NEED CAREFUL FEEDING

Too often the bull is housed in a dark, dirty stall and receives but little attention. Remember the bull is half the herd and that the future development of the herd depends largely upon what the calves inherit from him. The bull at all times should have proper feed and a plenty of exercise.

The young bull should be fed rather liberally as this is the only means of developing him to his full size, and an undersized animal is always looked upon unfavorably. Feed him a sufficient amount of grain to allow for rapid growth, regulating the quantity mostly by his condition. A young growing bull will do well on clover or alfalfa hay and from 4 to 8

pounds of grain daily. If a small pasture is available no hay will be needed. A suitable grain mixture is equal parts of corn and oats, or four parts of corn, one of oats or barley and one of bran. There is no objection to feeding the same grain ration as is fed to the cows.

Older bulls are less active and are inclined to take too little exercise. With them there is more danger of overfeeding than of underfeeding. They should be kept in moderate condition but never allowed to become too fat as this results in sluggishness and early loss of breeding powers. The old bull should by all means be turned out-doors in a lot for exercise.

PLAN WINTER RATION BEFORE PLANTING TIME

The man who gets the big cream check in winter is he who is wise in time. The foundation for successful winter's feeding in Minnesota is corn silage or roots for a succulent feed and clover or alfalfa for hay. The wise farmer looks ahead in time and arranges his crops to provide these necessities. If he does not he will have to be content either with a small cream check or be willing to go to the feed store and spend good money to balance up his ration.

The important thing is to be wise in time and to be properly prepared for winter by having a silo full of silage wherever corn is a safe crop or a root cellar stocked with mangels. With these and plenty of clover or alfalfa hay in the barn the main part of the ration is ready and the cow will scarcely know she is changed from grass to a winter roughage. With this good roughage the grain ration is not so difficult to provide.

CREAM MUST BE COOL TO KEEP SWEET

With the coming on of warm weather in the spring the creamery man begins industriously to smell and taste the cream as it comes to his door. Generally he finds plenty of what he expects—sour milk or cream.

Every one who is accustomed to caring for cream or milk knows it should be kept cool to keep sweet but fails often to begin cooling in spring until a batch or two is soured. All there is to having cream and milk in the best possible condition is covered by two words—CLEANLINESS and COLDNESS. However, neither one alone is sufficient. Granting that everything is kept in a condition of cleanliness above reproach,

milk will soon sour if not cooled. During the winter nature looks out for this but from spring on for a few months it is the job of the farmer or his wife to see that the milk is kept cold.

The cooling should be done promptly and thoroughly. Setting a can of cream in a small tub of water and leaving it without stirring is not real cooling. The use of a thermometer in cream held in this way will show the temperature comes down very slowly and as long as it is above 60 degrees the souring is checked but little. The means to be used will depend upon the facilities at hand. The important thing is to cool and cool quickly.

PUMPKINS GOOD FOR COWS IN MILK

Pumpkins are a splendid supplement to the ration for the cow in milk. Pumpkins, however, should be looked upon more as a relish than as an important source of food. The pumpkin contains over 90 pounds of water in each 100 pounds. Two and a half tons of pumpkins, including the seeds, are required to equal one ton of corn silage.

A fair feed of silage is 35 pounds daily. To replace this amount of silage the cow would require about 85 pounds of pumpkins.

The seeds are sometimes removed through the mistaken idea that they are injurious and dry up the cows. The seed not only is harmless, but is rich in protein and oils, and is a good food.

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I wish I was a banker, with a shiny limousine
I wish I was a grocer, selling prunes and kerosene.
I wish I was a mason, plumber, carpenter or such.
They only work eight hours a day. That doesn't seem like much,
To me, when I sit milking old Kit and Rose and Fly.
I'm soaked with sweat, the cows switch flies, and bat me in the eye.

But bankers have their troubles, and indigestion, too.
The grocer can't collect his bills, and don't know what to do.
The plumber's often out of work, the mason may get sick,
His wages stop right then and there, when he can't lay a brick.
But almost everything we need I get from our old cows.
I've milked electric lights, our clothes, and even tractor plows.

Milk purchased mother's washer, new range and ironing board.
It took a lot of pulling, but it even bo't our Ford.
We've all out doors to live in, and no one keeps our time.
The very best of grub to eat, and always feeling prime.
You couldn't take me from the farm, at least since I've learned how,
To pull just everything I need, from a good old Dairy Cow.

—Hodgson.

You can't get back more from the cow than you put in. Feed her.

Cull the cows as well as the chickens. An unprofitable cow can cost a lot of money.

There is no best breed of dairy cattle for all conditions. Have you good ones of the breed? That is what counts.

Alfalfa usually means dairy profits.

Cows say that a ton of alfalfa is worth a ton of bran.

Silage imitates spring pasture conditions and stimulates production.

Economy of production is all important and demands an efficient type of cow coupled with home grown feeds.

Good breeds and efficient types have been handed down to us by improvers who selected sires that had been pure bred for generations to establish certain characteristics. A purebred sire with such ancestry back of him has a uniform effect when used on grade or common herds.

The scrub sire, because of the conglomeration of breeds and types in his ancestry, has no true breeding ability, and "throw-backs" to undesirable qualities are inevitable.